# Marine Physical Laboratory

## Seadyn90 Modelling: Three Point Mooring of FLIP with Three Arrays

Gregory W. Beers

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## TABLE OF CONTENTS

# Seadyn90 Modeling:
# Three Point Mooring Of FLIP
# With Three Arrays

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August 23, 1991

Abstract:

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General Overview of Seadyn90
For Moorings and Arrays

The purpose of this report is to generally convey some of the principles of the Seadyn90 program that deal with modeling moorings and hydrophone arrays. The program is very diverse and nothing can be attempted without an NCEL Technical Note Seadyn90 User's Manual. The report deals with some of the important aspects of the User's Guide along with some of Seadyn's general rules. Seadyn has a very broad application spectrum, however this report only deals with the aspects of Seadyn90 that are applicable to modeling the moorings and arrays. The details of the FLIP problem are in the FLIP Mooring And Array report. Mr. Paul Palo at NCEL in Port Hueneme California is our contact and coauthor of the User's Manual.

Parts of the manual must be read before any attempt to run the program can be made. The very first thing to do is to look at the contents because in chapter 6.0, PROBLEM DEFINITION DATA, and chapter 7.0, SUBANALYSIS OPTION (SAO) DATA, the orders of the input cards are listed. This order does not matter in the actual program input, but because each card is simply a list of numbers and commas, a description is necessary when writing the cards. Constant reference of the card descriptions is necessary when writing input. Before learning about these cards however, are must learn about the program. Read chapters one and two thoroughly. Chapter 3.1 should also be read in full. The rest of three and four can be skimmed, but chapter five is essential. That is where the parameters for the input are laid out. Chapters six and seven are key to manipulating the program, but they cannot be read like the other chapters. It is best to get a general feel for them; then work them to understand how they can be used. There are so many notes for each card that they must actually be used to fully understand how they work. Not all of the input cards are used for any single problem. If no sample input is available, it is best to go down the list of input cards and read what they do, checking the ones that are applicable to the problem. It is best, however, to have a general sample from which to work. Then simply use the same cards as are in it, and manipulate them to fit the problem. The four samples in the back of the User's Manual can be used for this type of sample input, but they should not be attempted as problems. They do not work. Do not use the sample problems as problems, our version of Seadyn90 does not work with them! Chapters nine and ten should be referenced when they are needed. Nine is more or less troubleshooting and ten is the appendixes.

The key to using Seadyn90 is reading the data. There will almost never be a case where Seadyn completes an initial problem without errors. The error is always in the input, but inversely, the place to find it is in the output. In some cases Seadyn will give a diagnostic message. If this is the case, the message will be found in the output somewhere near the error. When this happens, use the User's Guide to try to interpret the diagnostic message.

In most cases however, there will be no message. The program will either fail, produces a set of zeros, or a ridiculous data set. If this is the case, go back through the output starting from the end. Always read the data from the end to the beginning. If there is one thing that Mr. Palo and his associates stress, it is that the way to read Seadyn output is from the end to the beginning. This way when scrolling back through the output it becomes apparent where the problem went astray. There are several parts to a full seadyn.out file. When modeling a ship in a moor for instance, it first does so with no current, then adds the current. The part with no current is called the DEAD file, the part with the current is called the LIVE file. There are often several LIVE files (for different current profiles), but there is only one DEAD file per problem. A good practice is to run a problem without the current first to see that the DEAD part of the program works. This should be done every time there are any changes in the problem. Once the DEAD works, the LIVE can be introduced and debugged with confidence that any new errors lie in the LIVE file.

There are many other parts to the output, and they can often aid in solving errors. Before the DEAD is a NODE POINT SUMMARY which describes in global coordinates where the nodes were actually assigned. Then the DEAD adds gravity to the nodes and elements. There is also the ELEMENT SUMMARY DATA which describes what nodes are connected to produce what elements. The material code number, the initial tension, and the residual mass are also included in the report. The unstretched lengths and initial lengths are also provided here as well. The unstretched lengths are the lengths before the DEAD, and the initial lengths are those after the DEAD. The ADDITIONAL ELEMENT DATA contains the slopes of the elements. This is good for finding angles of the lines or arrays in the no current situation. The cosine of the third column gives the angle of the element to the vertical. This is good for seeing what the angle is that the line makes with the ship. The rule to follow is the "third column inverse sine horizontal" rule, which states that the inverse sine of the third column of the slopes output gives the angle that each element makes with the horizontal. This means that the inverse cosine of the third column in the slopes output gives the angle that each element makes with the vertical. These outputs help to analyze the angles that the mooring lines and arrays make with the sea floor, and with FLIP. It is imperative to understand that all of this data before the DEAD is independent of the current, even when a LIVE is introduced. In fact some of it is even independent of the DEAD, such as the NODE POINT SUMMARY and the unstretched lengths of the elements. All of the data before the DEAD is without any current!

This outlines the fact that when reading the data, always start at the end, always, and use all of the output to try to find the errors. More often than not the error will be a misplaced comma or a wrong number, but is impossible to tell just by looking at the input. Use what Seadyn provides, it is there to help.

Some of the things that Mr. Palo expressed were that loads must be slowly applied (in our case the only load beside gravity is the current). This is only applicable to files such as DYN that are not used in mooring models. When using these however, it is necessary to ramp loads. That is, start at a quarter knot, go to a half, three quarters, and so on. With the LIVE file however, this is not necessary. Sometimes the load in a LIVE may be too large and the program will crash or give poor readings, but ramping will not help. The load is just too large for the way the problem is set up.

The nodes must be described consecutively, and each altitude must have all the nodes in that altitude recorded. This is why the nodes in a mooring must spiral around from altitude to altitude as was done in the FLIP problem. This "spiralling" is described in detail in the FLIP Mooring and Array report.

For a gentle curve, a minimum of eight elements per line must be used. Nine hundred nodes can be used, but only one hundred and eighty can be used safely. When viewing the output a large screen is needed because the output is very wide. If using Sunview, "vi" the seadyn.out file in a window the width of the screen. For printing, make sure the printer is wide enough or that it is manipulated to fit on the page with imprint -L, or something comparable. Every LIMIT input card requires a LLOC input card, and similarly, every BODY input card requires a BLOC input card. This makes sense because the limits and bodies need to be described, and then they need to be placed. The tension that the program places on the lines is felt in the elements, not the nodes. The nodes are simply points.

An important part of working with Seadyn is getting the problem to run, and then manipulating it to have all of the parameters required. That is to say that an initial tension must be input, even if its correct value is not known. Every element needs to be described in the TENS input card. The catenary for the nodes must also have an initial tension. This catenary tension is the pivotal tension because in most cases the TENS card will simply be told to calculate the tensions from the first element's tension in each mooring leg. Thus the initial horizontal tension must be in the NGEN card where the catenary is described, and the vertical tension will be calculated from the weight of the line. To get all of this to work and give results that make sense, it is necessary to run the problem over and over, slightly changing the tensions to give data that corresponds closer to the required parameters each time. The program has trouble with assigning the elements lengths, therefor it is necessary to play with the tensions and anchor points to get the line at the required length and angle from the ship. This principle is a key to working Seadyn. Get an answer, and then manipulate it to get within the necessary parameters!

One last thing to always do before running Seadyn is remove the previous seadyn.out file. With it still in the computer, the program will simply overwrite it with the new one. If this happens some of the old data might show through and confuse the user. One thing that to this day does not seem to work quite right are word nine and word ten in the MATE input card. These are the tensions and strains in the material, and they take the form of the modulous of elasticity. It does not seem to work quite as is expected however, so if some errors in element length or tension are encountered, this is a good place to start looking.

## How To Run Seadyn90

For Sun:

The Seadyn90 program is on magnetic tape. There is a reader in building 4. Set up a separate file for it, and simply type "doall". This is an executable and will compile the program. The program is written in Fortran77, the "doall" command executes all of the f77 commands needed.

For Other Systems:

The Seadyn90 program is on magnetic tape. Read it into the system and set it up under its own file. The program is written in Fortran77 and thus must be compiled on the system in order to run. When compiling, compile and link all of these ".f" files in this order: seamain.f seadyn0.f seadyn1.f seadyn2.f seadyn3.f seadyn4.f seadyn5.f seadyn6.f seadyn7.f seadyn8.f.

To execute the program, first remove any seadyn.in or seadyn.out files. The active input file must be called seadyn.in. This is what the computer looks for from the user. The seadyn.out file is the file that contains all of the output. As stated in other parts of this report, always be sure to remove the seadyn.out file before running the program. If a seadyn.out file already exists the program will simply write over the existing one, and all of the data will become entangled. Now write the input file, seadyn.in, and execute the program using the executable. For instance, on the Sun, the default executable is "a.out".

When executing a mooring and/or array problem, the program should run for no more than two minutes on a Sun 4/490. If it takes longer, then something is wrong. Most mooring problems will take seconds if input properly, but some may take a while if there are several LIVE files and many elements. When the program is done, go to the end of the seadyn.out file (always go straight to the end of the output file) and make sure that it says:

NORMAL TERMINATION OF SEADYN

If it does, then all is well. If not, then start with the troubleshooting procedures from the end to the beginning. If all is well, proceed to "filter" or a comparable filtering program to taper the seadyn.out file to a matrix that can be read by Matlab. Enter Matlab with this matrix and manipulate it within Matlab to graph the different legs and arrays.

If the program is being run on a Sun, then these three commands should have aliases:

rm seadyn.out

vi seadyn.out

vi seadyn.in.

These three commands will be used over and over again each time the program is run. Whatever computer is being used, it is suggested that these three commands for removing seadyn.out, editing seadyn.out, and editing seadyn.in be shortened.

Seadyn Uses For Matlab

And Program Filter

The Matlab program called "Pro Matlab" is essential for analyzing Seadyn output. The program is streamlined for matrixes, and the Seadyn output file is a series of matiixes with extra garbage tacked onto them. The main use of Matlab for Seadyn users is to graph the data. Seadyn provides the global coordinates of the nodes in each DEAD and LIVE output file. These nodal points can be graphed by Matlab to give the orthogonal views of the mooring legs and arrays, as well as a plan view of the system. There may also be a way to get a three dimensional view.

To get to the Matlab stage of the graphing procedure, the Seadyn output file must first be filtered down to a matrix or matrixes that can be read by Matlab. There is a very simple program included in this report that does this. It is aptly named "Filter", and a listing of it can be found in figure four. This program is too simple because it is rough and only allows one DEAD or LIVE file to be filtered per run. It is written in Fortran77. It would be much more advantageous to have the program written in the Matlab language, which is more or less Basic, so that every time something needed to be filtered, the Matlab program would not need to be exited. When using "Filter", every time a new piece of data needs to be analyzed, Matlab must be exited to run it.

Although it is rough, "Filter" does do a good job. After executing it, a small title appears and asks if the file to be filtered is a DEAD or a LIVE file. Enter a "d" or an "l" and it will filter the file. When it is done it will give an error message signalling the end of the requested file. If the file was a DEAD file, the new output file will be "dead.dat". If the file was a LIVE file, the new output file will be "live.dat". These files are matrixes that are three by however many nodes. They must then be remote copied to the directory that houses Matlab. This could be on the same computer, but if using a network, make sure that Matlab is in a directory that is on the local station. The graphs will only show up on a local computer, no remote logins can be employed. When the "dead.dat" and "live.dat" are copied, Matlab can be run.

Once in Matlab, the "dead.dat" and "live.dat" files must be loaded. This is done by the commands, "load dead.dat" and "load live.dat". With the matrixes loaded, they can be referred to as "dead" and "live", and the data manipulation can begin. The big ideas to understand in data manipulation are skipping and finding the hypothenuse. The skipping concept is due to "spiralling". This Seadyn quirk places the nodal points for each leg six nodes apart for the data that in includes the arrays, and three nodes apart for the naked mooring data (example one). The way to break up the data is to make an array (a mathematical array, not a hydrophone array) for each mooring and array leg altitude. To do this, take the "z" coordinate from the third column of the data, and skip the correct number of nodes between readings. This will give six arrays, one for each mooring leg altitude, and one for each array leg altitude. The next step is to make a mathematical array for each excursion from the origin. To do this find a variable "r" that is the hypotenuse of the "x" and "y" coordinated of each node. The "x" coordinate is the first column of the data, and the "y" coordinate is the second column. Make the "x" and "y" columns mathematical arrays, square them, multiply them, and take the square root. This product is an array with the value of "r" for each node. Matlab can do all of these mathematical array functions, that is why it is essential in analyzing Seadyn output. With the "r" array complete, use the proper skipping number to break it up into different mathematical arrays that correspond to the "z" arrays. Now to graph one leg of the problem, simply graph one of the "r" array with its corresponding "z" array.

To get a plan view of the system, plot the complete "x" array with the complete "y" array, but make sure to do it with points and not lines. When Matlab tries to plot this with lines, it makes a crazy pattern. The orthogonal views of the array legs can be plotted with lines however. When the LIVE data is manipulated, there are a few catches to watch out for. The current must be running along an axis in the plan view, and then some of the node's coordinates along this axis will be pushed past the origin. An example of this is the upstream array in examples two, three, and four. This array, and the two upstream mooring legs, start in positive "x" space, and end at FLIP which is in "-x" space. This means that when squaring the "x" coordinates, the ones that are on the wrong side of the origin will have incorrect values. They will be numerically correct, but the negative of what they should be. This can be corrected manually, or there can be separate manipulating programs for different current directions. Writing manipulation programs seems to be the most economical route to take.

These data analysis procedures are not set in stone. They are not as economical as they could be, but they are on the right track. Use the "Filter" program as a guide for a way to taper the data, but it would be advisable to expand on it so that it could handle several files at once. If possible, incorporate it in a Matlab program. For the manipulation, it would also be advisable to have a series of small programs that do what is required. It is time consuming to set up each graph individually. Matlab does a nice, clean job of Seadyn data analysis if done properly.

## FLIP Mooring And Array Report

This is a detailed report on the methods involved in modeling the spar buoy FLIP in her three legged mooring with three Difar arrays. While reading this it would be a good idea to follow along with any of the seadyn.in examples provided, this will help illustrate what is being discussed. The first part of the report describes the modeling of FLIP in her moorings alone. Then the arrays are introduced and the rest of the report describes several methods of solving this problem. The parameters of the problems will be illustrated, followed by the methods for solving them. The most important of these methods is called "spiraling", and will be described in grave detail. This concept is the keystone for modeling moorings (and arrays) with Seadyn.

The parameters of the problem vary from trial to trial. The first example output, sea.9.out, has different parameters than the other three outputs. These differences will be outlined in the explanation of each output. The general idea however, is to model FLIP in twelve to fifteen thousand feet of water with three mooring lines and three Difar arrays. FLIP is a spar buoy as shown in figures 1a and 1b. She is shaped like a coke bottle with an average diameter of 17.4 ft and a 300 ft length. Her stem is 300 feet below the surface of the water and this is where the arrays are attached 120 degrees out of phase of each other. The mooring lines are attached to the water line 120 degrees out of phase of one another and 60 degrees out of phase of the arrays. This is depicted in figures 2a and 2b.

The mooring lines are 1 and 1/2 inch diameter, 2 in 1 nylon, 100% double braid, with an official breaking strength of 66,300 lbs. Our lines are reinforced however, and have a breaking strength closer to 80,000 lbs. There specific gravity is 1.14 which translates to 0.1068 lbs/ft because it is calibrated in fresh water. The mooring lines are about 20,000 feet long in 12,000 feet of water. The anchors are

750 lbs Danforth Anchors with 400 feet of chain weighing approximately 20,000 lbs. The arrays in are about 22,000 feet long in 12,000 feet of water. The first 7,500 feet of each array is the same 2 in 1 nylon as in the mooring lines. The rest of the array is made up of 1,500 m (5,000 feet approx.) modules with a 1 and 1/2 inch diameter, and a weight of 0.200 lbs/ft. There are 3 modules used in 12,000 feet of water. The most accurate readings were found with the anchor excursion being 17,000 feet in 12,000 feet of water, and the scope for the mooring lines at 1.66, which is close to the estimated scope of 1.5. The anchor excursion for the arrays is 17,500 feet, and the scope is 1.87. All of these parameters are products of each other. That is the way Seadyn must be used, all of parameters are dependent on one another, and thus they must be manipulated to produce correct results. Thus some of these inputs, such as the anchor excursions and scope, are not set in stone, they are the product of the inputs that gave the best results. If some new data were to come in that better described a parameter, then it should be corrected. These are all very accurate trials and seem quite close to what is happening in the real world.

This is a general description of the methods for solving mooring and array problems with Seadyn. A detailed description is included in the reports on each sample output. The first thing to do is draft an approximation of the excursions and scopes. Then decide on anchor points, one should always be in line with the current. In this case the current runs along the x axis, thus the number one mooring leg is in the x/z plane. When the arrays were introduced, the Beta array is 180 degrees out of phase of the number one mooring leg, so it also lies in the x/z plane. The other anchor points must be calculated and described in the x/y plane. The x/y plane describes the horizontal, and the z coordinate is the altitude. FLIP should be placed at (0,0,0) in a no current situation. Thus when describing the anchors, the depth must be included as a negative number. It is good to have the current along the x axis, because then if the system is symmetrical, all excursions of FLIP will be along the "x" axis as well. This makes the excursions easy to calculate. The rest of the system must be described using the "spiraling" method.

The "spiralling" method is used because Seadyn cannot calculate one mooring leg array at a time. All forces on each leg or array depend on the forces acting on the others. Thus Seadyn must work its way up the system starting at the sea floor. The first nodes described must be the anchors. If arrays are involved, their anchors must be described with the mooring leg anchors. This means that the first node in a mooring and array model is the mooring leg 1 anchor. The next is the Alpha array anchor, then the mooring leg 2 anchor, then the Beta array anchor, then the mooring leg 3 anchor, and finally the Gamma array anchor. Now the first six nodes are the anchors described in a clockwise manner. The next node to be described is the next node on mooring leg 1, then the next node on the Alpha array, then the next node on mooring leg 2, and so on spiralling clockwise up to the last node in each mooring leg and array. The final two nodes must be the water line and stern of FLIP. They must be described in that order, the water line must be first. The program crashes if the order is reversed.

The description of the nodes is important, if one comma is misplaced the whole symmetry of the problem will be thrown off. The anchor nodes and the FLIP nodes must be described in the NODE card using global coordinates. The anchors should be fixed in all three directions using the fixity code "3" in words six, seven, and eight of the NODE card. The water line of FLIP should also be fixed in the "z" direction by word eight of the NODE card, or by a FIX command in the DEAD card. The rest of the nodes are described in the NGEN card. There should be one line in the NGEN card for each mooring leg or array being defined. This card is also where the weight of the line and the horizontal component of the tension must be recorded for calculating the catenary. This is essential to the shape of the lines and arrays. Each line in the card should state the number of nodes being generated, then the starting node (an anchor point), and then the ending node (FLIP's water line for the mooring legs and her stern for the arrays). The next word in the card is the node numbering increment code. If there are three mooring legs and three arrays, then the code must be six. The rest of the words in the card are important as well. Use the User's Guide when inputting them. Do not forget the weight (lbs/ft) and the horizontal tension (lbs) for the catenary. The ELEM card describes the elements, and because the elements are simply lines made of some material described in the MATE card that connects two nodes, they must also spiral. Elements one through six must connect the anchors in each mooring leg and array to the next node in each. The rest of the elements must spiral around as the nodes do. The final elements in each mooring leg and array must connect the final node in each to the water line or stern of FLIP respectively. The final element should connect FLIP's water to her stern. It should be three hundred feet long and have a constant diameter of 17.4 feet which is the cross sectional area average of the actual FLIP diameters. That is to say that three hundred times 17.4 feet produces the same area as the real FLIP's cross section produces. This means that this model of FLIP should have similar drag characteristics to the true coke bottle FLIP.

The TENS card should have one line for each mooring leg and array, plus one for the FLIP element. As in the NGEN card, the elements must be described as a series. This should start at the anchor point, but unlike the NGEN card, these series should end at the node just before FLIP in each mooring leg and array. They should skip the same number as the NGEN skipped, and the tension should be calculated from the anchor points. The FLIP line should start and end with the FLIP element, not skipping any. Word five should be used in the FLIP line to describe the actual tension. It does not matter what tension is used because it is all within the FLIP element.

The MATE card describes the materials used. The words nine and ten are the modulous of elasticity. For the nylon, 2,000,000 to 1 (2000000,1), seemed to produce correct results. The FLOW card describes the current and must be written with the User's Guide. The FLUID card should have one line, ",1", which means that the medium is seawater.

The order of the above cards does not matter, but the order of the next three cards is essential. The first card in any seadyn.in file must be the PROB card. This contains the number of nodes and elements in the system, along with the direction of the coordinate axis, and the output code number. Refer to the User's guide for these codes. The second to last card must be the DEAD card. The card can be empty, but the DEAD must be there to tell the program to calculate the problem with no current. The water line of FLIP can be fixed in position with the FIX command in this card to make sure that the symmetry is correct, but it is not necessary. However, if the "z" direction of the water line is not fixed in the NODE card, then it must be fixed here. The last card must be the LIVE card. This is where the current is introduced. If any nodes were fixed other than the "z" direction of the water line of FLIP, then they must be freed here using the FREE command. The CURR command should also be used in this card to further describe the current. Use the User's Guide to see how to operate these commands.

The last line in any seadyn.in file must be END. More details will be included with each output report, but the concept of "spiralling" should be fully understood here before continuing. It is the key to Seadyn modeling of moorings and arrays.

Fig. 1a

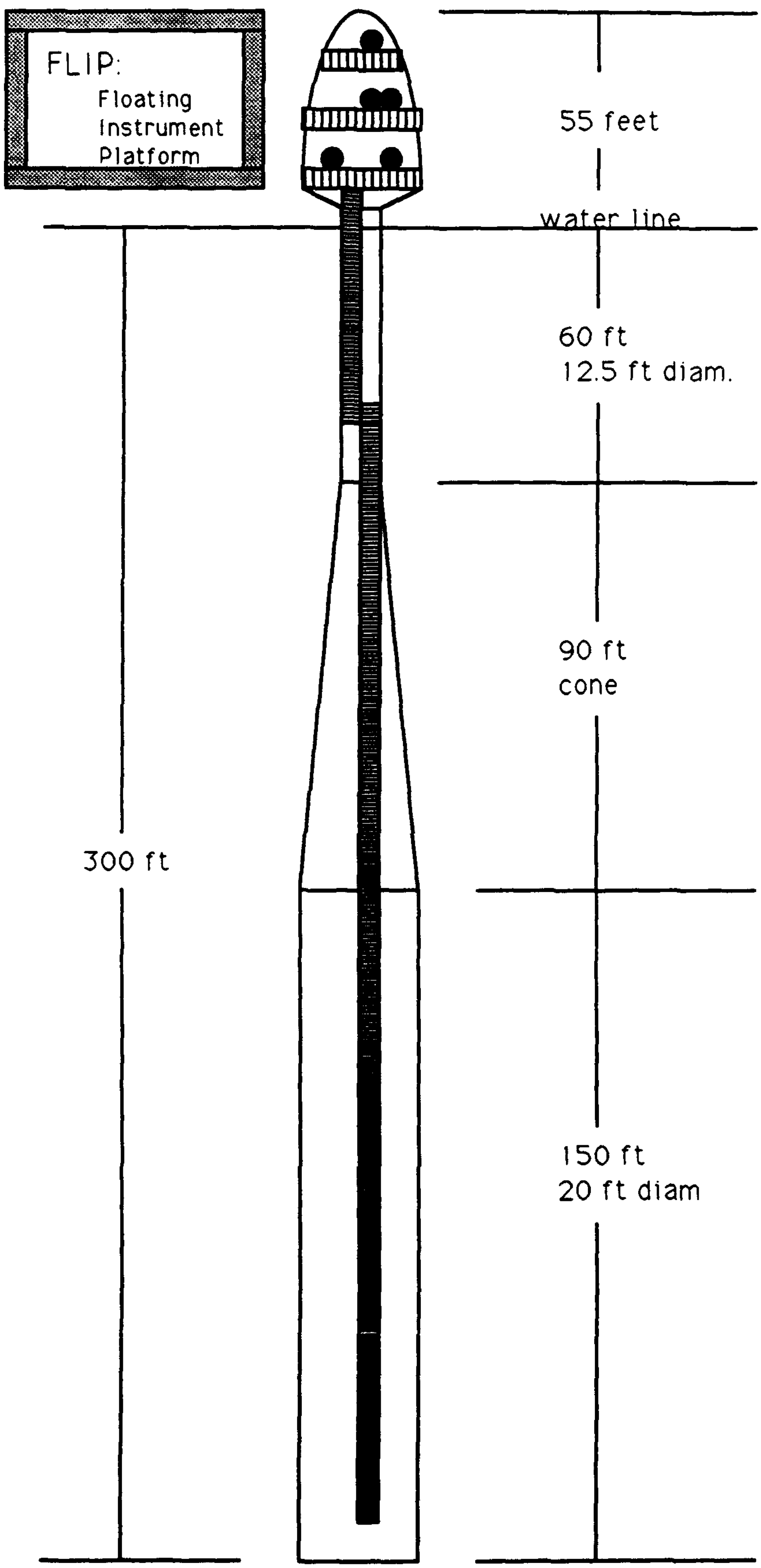

FLIP:
Floating
Instrument
Platform
55 feet
water line
60 ft
12.5 ft diam.
90 ft
cone
300 ft
150 ft
20 ft diam

Fig. 1b FLIP Mooring And Array Legs

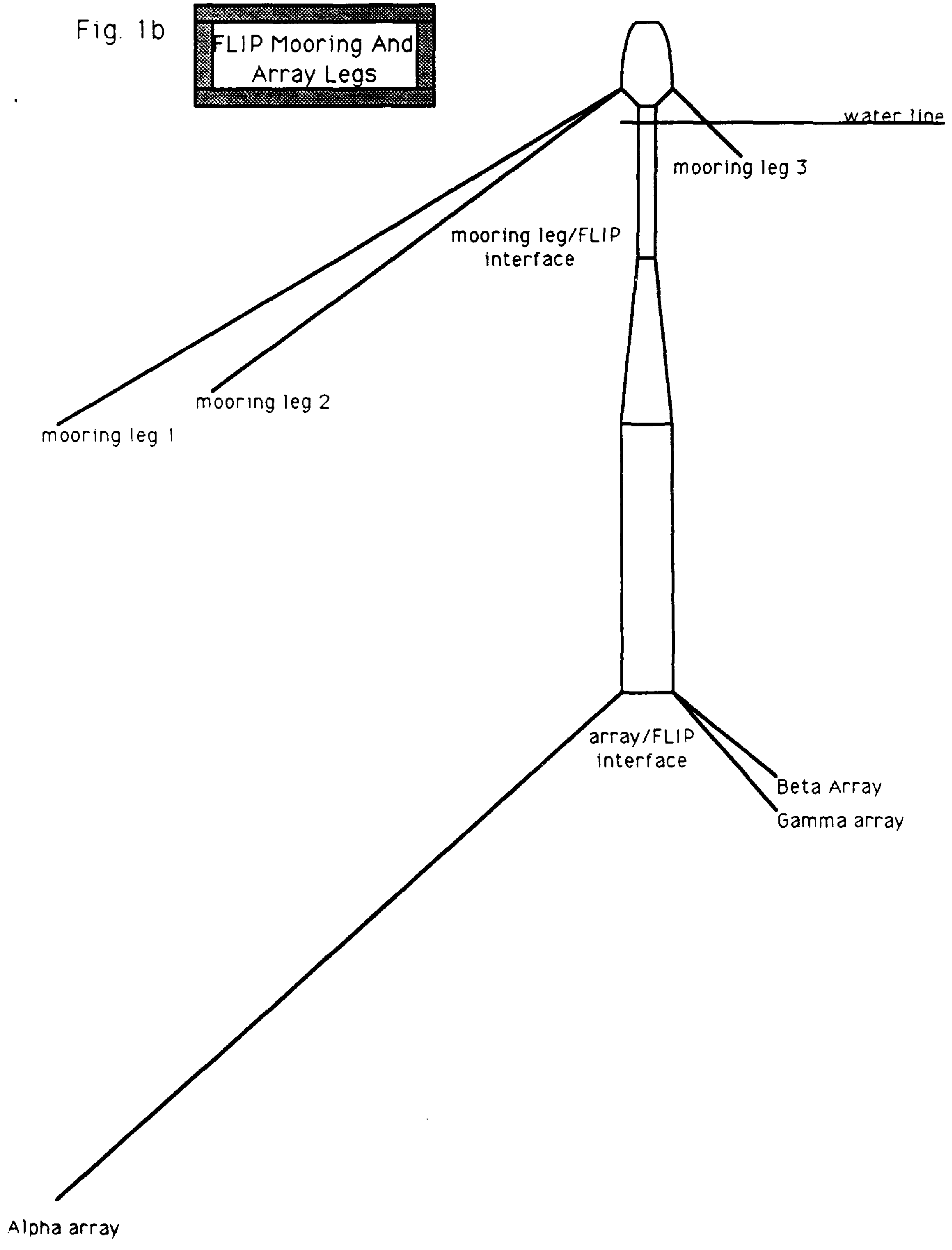
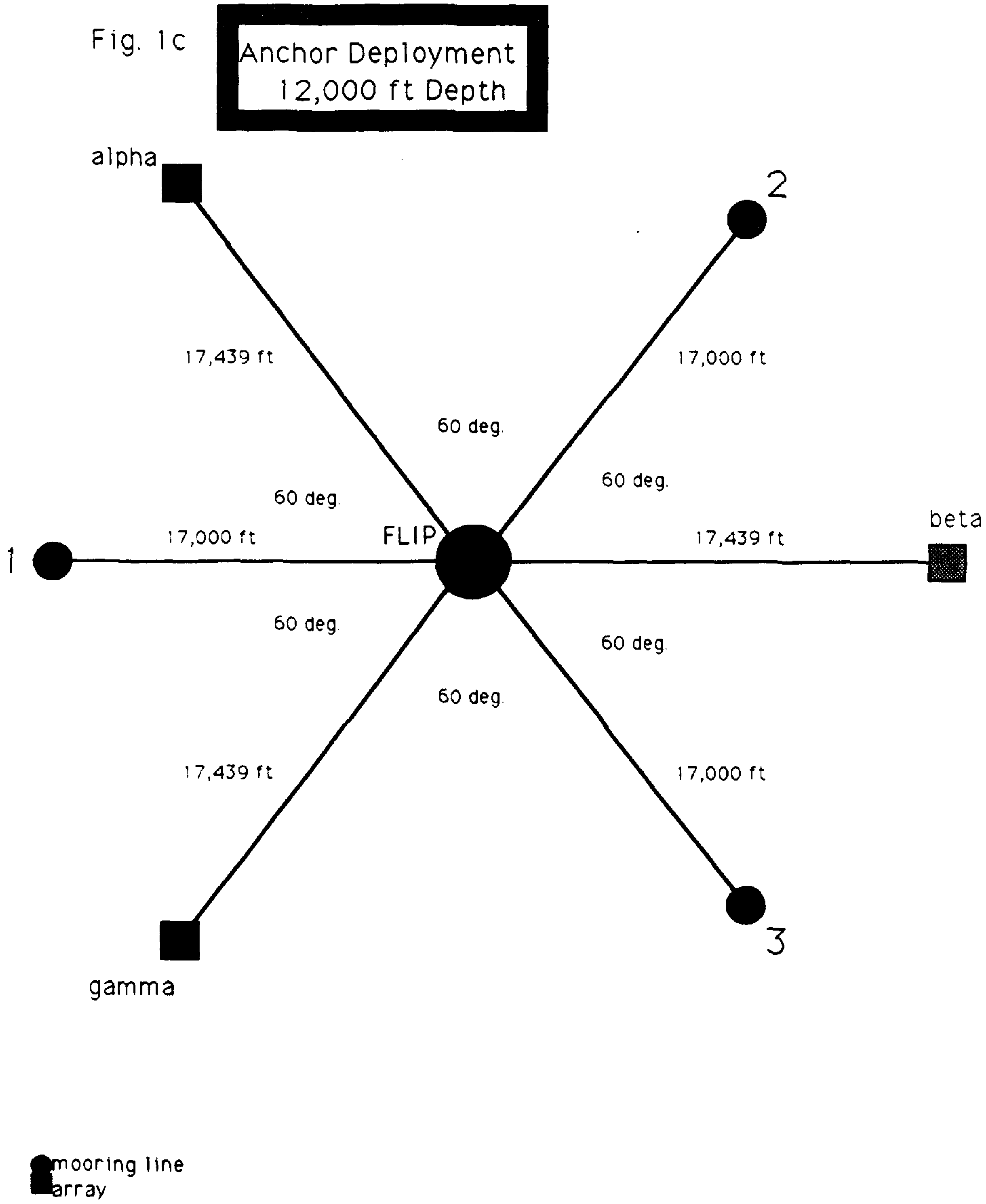


Fig. 1c



Anchor Deployment
12,000 ft Depth
alpha
2
17,439 ft
17,000 ft
60 deg.
60 deg.
60 deg.
FLIP
beta
1
17,000 ft
17,439 ft
60 deg.
60 deg.
60 deg.
17,439 ft
17,000 ft
gamma
3
mooring line
array

Fig. 1d

**Anchor Deployment
15,000 ft Depth**

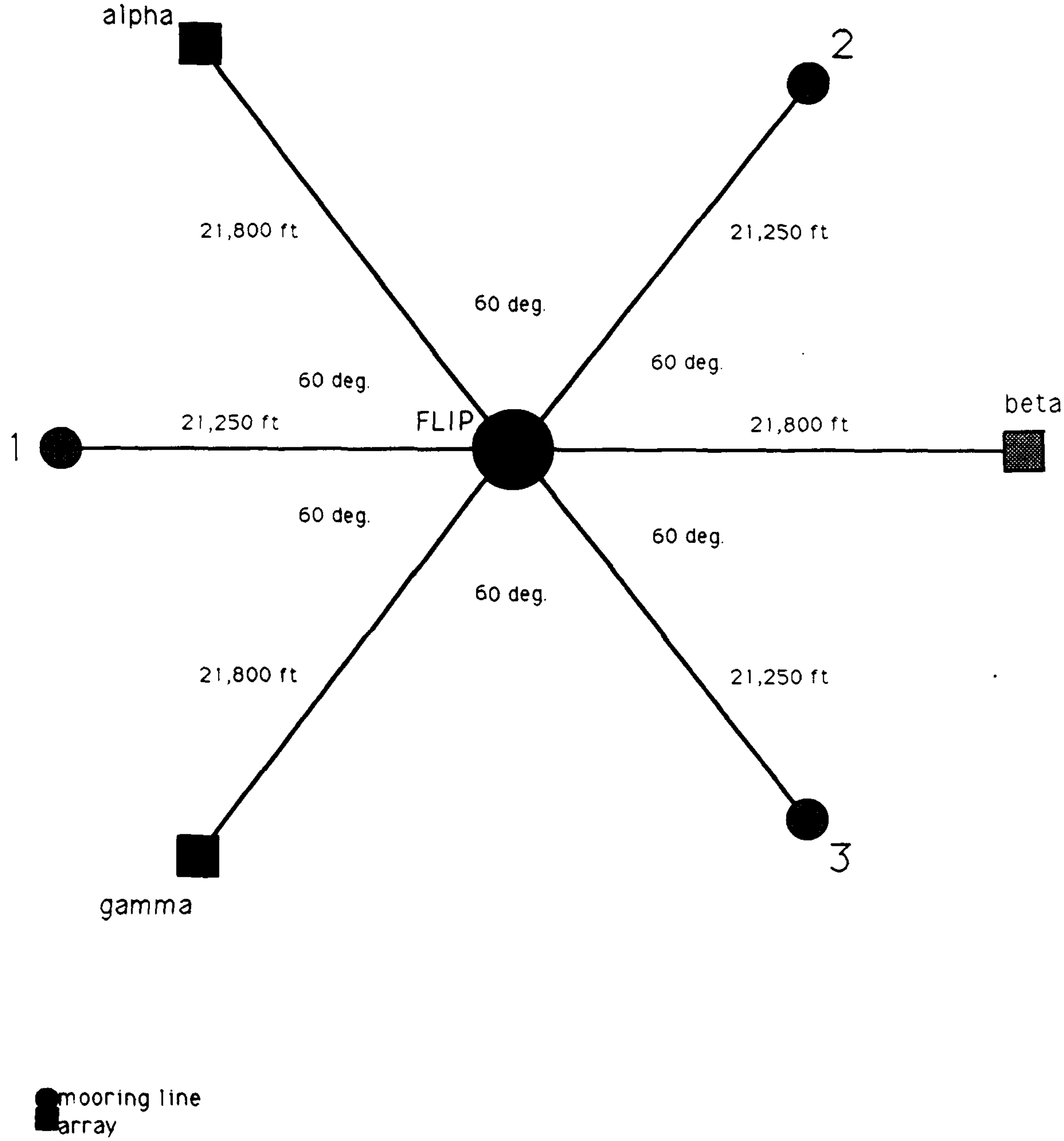


Fig. 2a

FLIP Mooring
Birdseye View

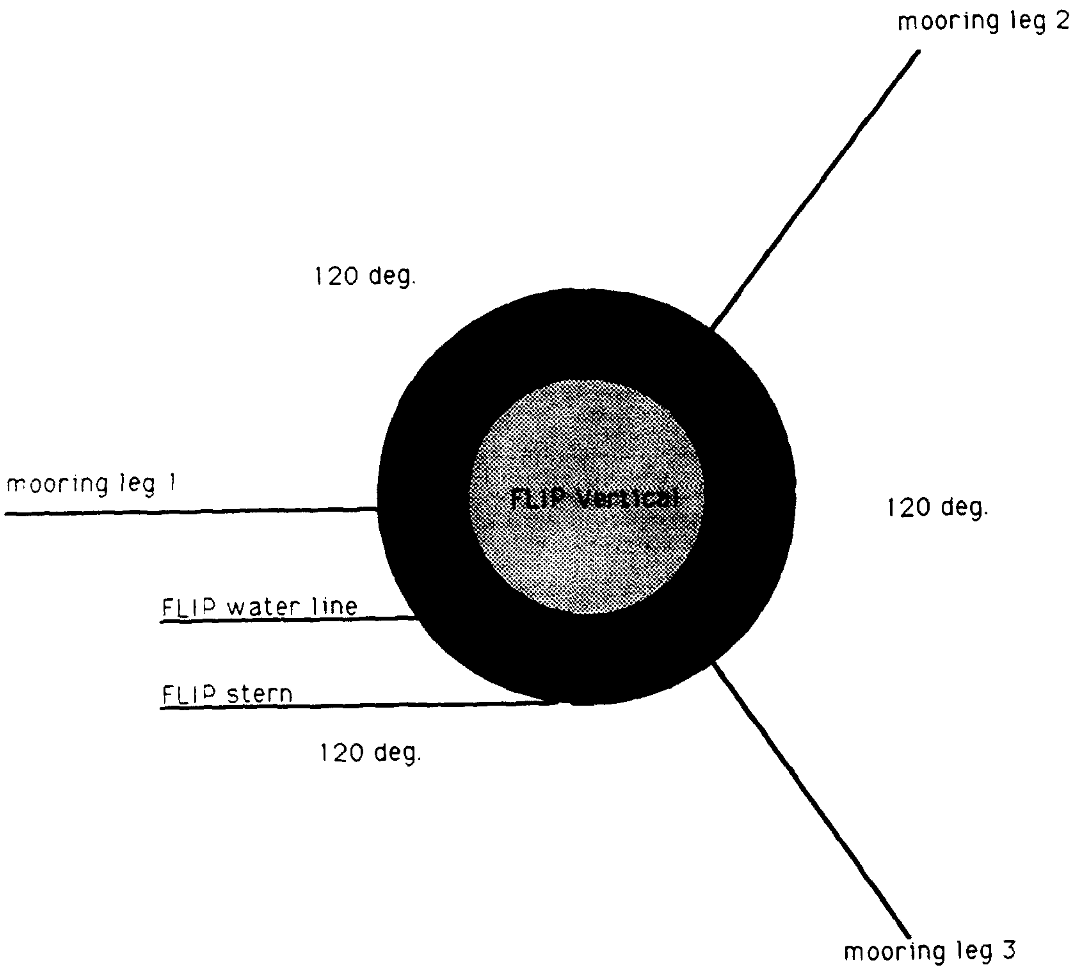
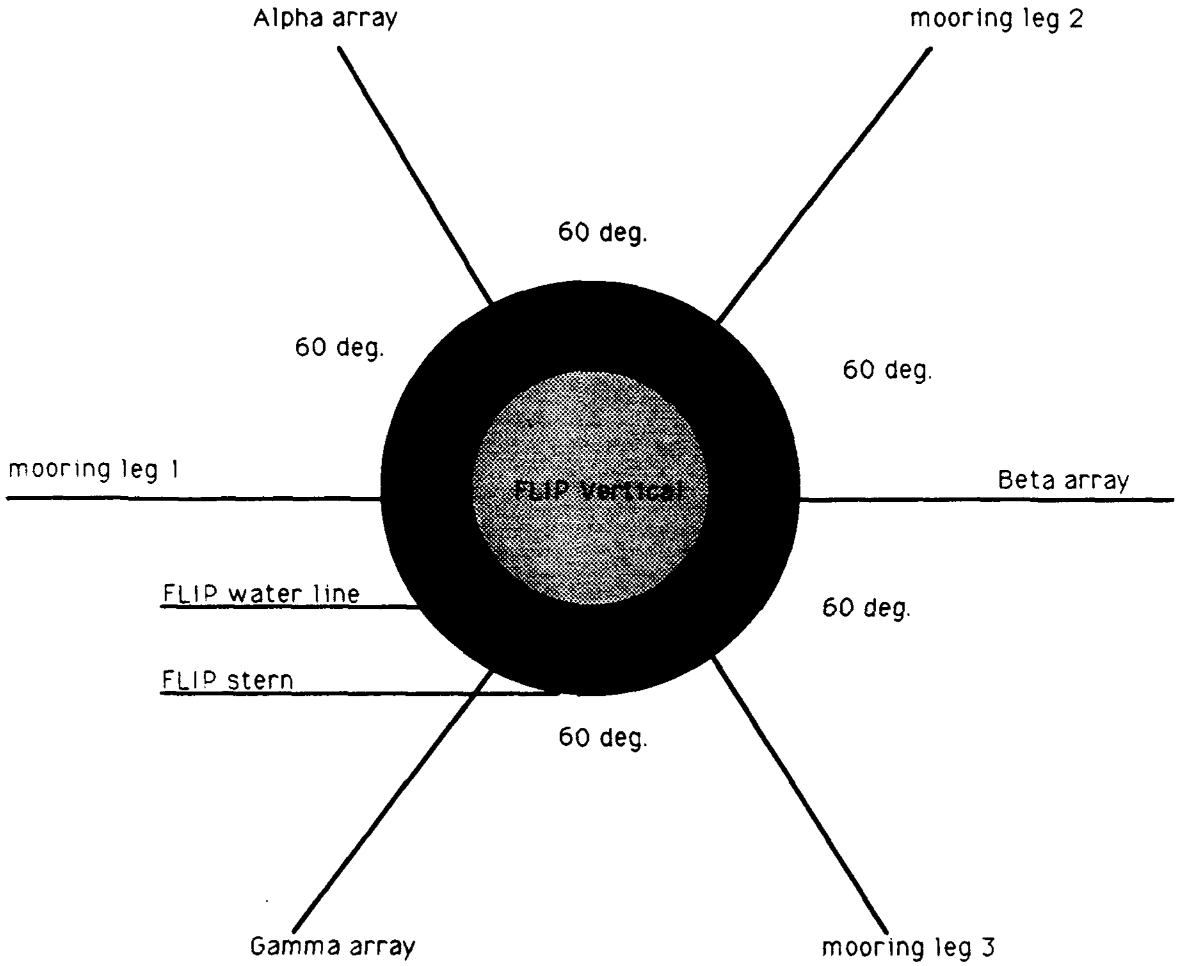


Fig. 2b

FLIP Mooring and Array Legs
Birdseye View



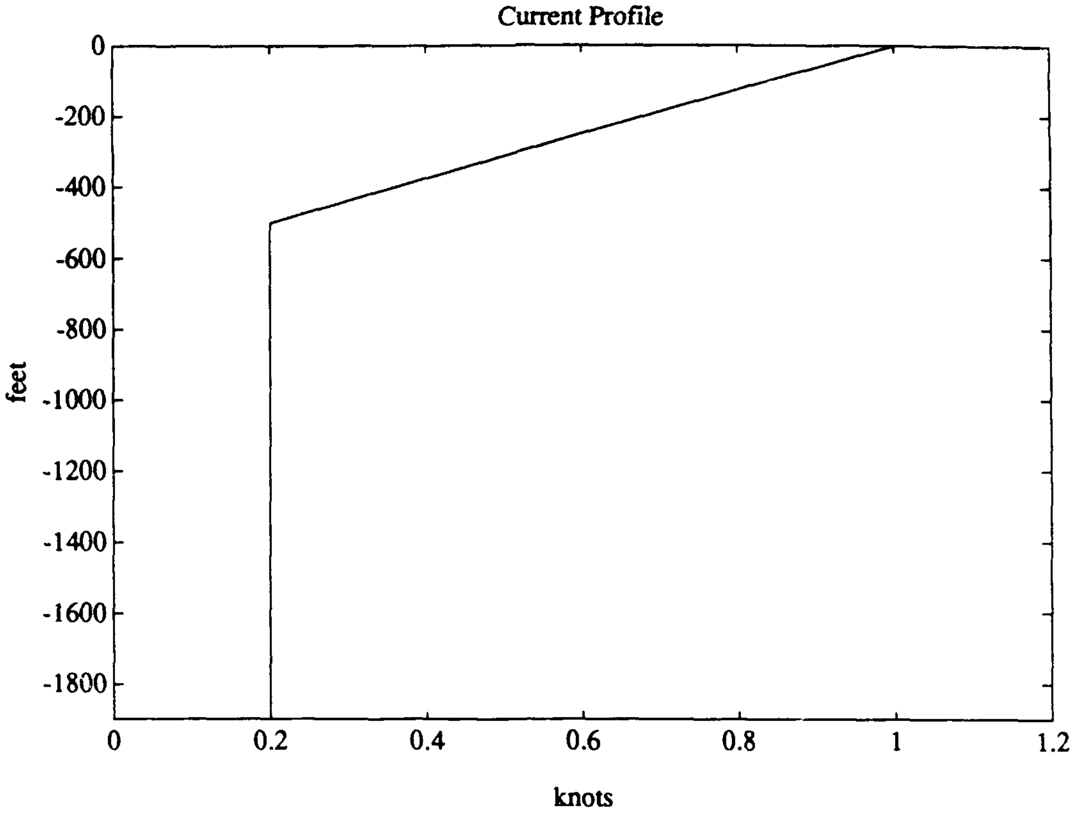

Current Profile
0
-200
-400
-600
-800
-1000
-1200
-1400
-1600
-1800
feet
0
0.2
0.4
0.6
0.8
1
1.2
knots

Figure 3

```
      PROGRAM FILTER
C***************************************************
C
C This program filters out any DEAD or LIVE seadyn.out
C file to give a simple 3x180 matrix (or less).
C The format is 3E13.7
C
      CHARACTER NODE*33, YES*1, THE*1
      DIMENSION X(180), Y(180), Z(180)
      WRITE(*,*) ' '
      WRITE(*,*) '                Welcome to FILTER.'
      WRITE(*,*) ' '
      WRITE(*,*) '          Is this a dead or live case?(d/l)'
      WRITE(*,*) ' '
      READ(*,*) THE
      OPEN (5, FILE='seadyn.out')
      IF (THE .EQ. 'd') THEN
      OPEN (6, FILE='dead.dat')
      ELSE IF (THE .EQ. 'l') THEN
      OPEN (7, FILE='live.dat')
      END IF
C
    1 READ(5,101,END=999) NODE
  101 FORMAT (5X,A33)
      IF (THE .EQ. 'd' .AND. NODE .EQ.
     1'DEAD LOAD INCREMENT =          1    ') THEN
      GOTO 500
      ELSE IF (THE .EQ. 'l' .AND. NODE .EQ.
     1'STEADY STATE INCREMENT =         1') THEN
      GOTO 500
      ELSE
      GOTO 1
      END IF
C
  500 READ (5,502,END=999) YES
  502 FORMAT (24X, A1)
      IF (YES .NE. 'X') THEN
      GOTO 500
      END IF
C
  600 READ (5,501,END=999) X(I), Y(I), Z(I)
  501 FORMAT (17X,E13.7,2X,E13.7,2X,E13.7)
      IF (THE .EQ. 'd') THEN
      WRITE (6,601) X(I), Y(I), Z(I)
      ELSE IF (THE .EQ. 'l') THEN
      WRITE (7,601) X(I), Y(I), Z(I)
      END IF
  601 FORMAT (F13.2,1X,F13.2,1X,F13.2)
      I = I+1
      GOTO 600
C
  999 STOP
      END
```

Figure 4

Example One

sea.9.in

.out

No Arrays

This is a description of sea.9.in and sea.9.out, the input and output files of an early Seadyn run with no arrays. Follow along with the sea.9.in and sea.9.out files, they have notes down the right side of the page to aid in this explanation. This report will explain these notes, and give a good idea of how an accurate, simple run should go. The incrementing step in this run is three because there are three mooring lines and no arrays. When reading the output, three lines must be skipped each time to follow one mooring line leg. For example, to follow the number one mooing leg, look at element 1, then 4, then 7, then 10, and so on skipping three each time. This is do to "spiralling" and is the case in all input and output. To further understand "spiralling", read the FLIP Report.

Input File (sea.9.in):

To understand the output, one must first understand the input and why it is done the way it is. This is a description of the sea.9.in file that directly follows this report. The input file is appended with notes to help with the translation. The first line in any input file is the title line. Read the User's Guide for the parameters, but for simple use, just do not use any commas, and end it with a dollar sign, "$". Any further notes must have a "*" in front of them, this can occur anywhere in a line, but then anything after it will not be read by Seadyn. In this case "sea.9.in" is a note right after the title line. Now it is time to start writing the input cards. The first input card in any seadyn.in file must be the PROB card. This card describes a system with 152 nodes and 151 elements. The "-3" is the code for the gravity to be in the "-z" direction. This makes the "z" axis the vertical axis, and all depth records are thus put in the "-z" coordinate place. The "1" is the input print option flag; it tells Seadyn to echo all input, and print the initial state data for all nodes and elements. This gives a full output file.

The FLUID card simply tells Seadyn that the medium is seawater. The NODE card shows the global coordinates of FLIP and her three anchors. For example, node 1 ,which is anchor 1, has the coordinates: x=-16000, y=0, z=-12000. Node 151, which is FLIP's water line, has the coordinates: x=0, y=0, z=0. This means that anchor one is 16,000 feet away from FLIP on the "-x" axis, and is at a depth of 12,000 feet. The hypotenuse of the other anchor points' "x" and "y" coordinates equals 16,000 ft, so all of the excursions are equal.

The important note in the NGEN card is that this is where the catenary is described. The last two numbers in each line of this card are the weight and the horizontal component of the tension (lbs) in each mooring line. The weight and the tension describe the shape of the line because word seven in each line is "1" which means that the shape is a type of catenary, and thus dependent on these parameters. Notes on the ELEM card are in the input file.

In the TENS card, it is important to understand that the last node in each series is not FLIP, it is the last node in each mooring line. This isolates the tension in each line. The fourth line in this card is FLIP. It is present because FLIP is described as a piece of cable, and according to Seadyn, it must have a tension. Instead of having the computer calculate it, it is assigned as "1" in word five.

The first line in the MATE card describes the mooring line material, it is material "1". Line two describes FLIP, and is material "2". That is why all of the mooring line elements in the ELEM card have a "1" in word five, and the FLIP elements have a "2" in word five. Word three in the MATE card is the diameter in feet. It is 0.125 ft (1 1/2 inches) for the mooring line and 20 feet for FLIP. This is an early seadyn input file, in later runs the FLIP diameter was corrected to 17.4 ft.

This is a prime example of how the trials can be constantly updated. The "W9" after word four, which is the weight of the material, simply means skip to word 9 of the card. This is explained in chapter five of the User's Guide. The last two words in each line of this card are the modulous of elasticity. For the mooring line it is 200,000 to 1 which seems to be correct. This was determined by trial and error; checking the % elongation to the % of breaking strength that the tension is providing. It was later corrected to 2,000,000 to 1. This may need to be fiddled with. The modulous of elasticity for FLIP is arbitrary, it just must be high enough that she does not stretch.

Words three, four, and five of the FLOW card describe the current in global coordinates. Word three is the "x" coordinate, word four is the "y" coordinate, and word five is the "z" coordinate. In this case the current runs along the "x" axis in the positive "x " direction at one knot (1.688 ft/sec). The next two cards must be in order.

The DEAD card has a FIX command. To fix a node, the node and direction must be described. This is done by adding a "1" for the "x" direction, a "2" for the "y" direction, and a "3" for the "z" direction, to the node number. Here node 151 is fixed in all directions with "1511,1512,1513" in words three, four, and five. This must be done in the "z" direction because node 151 is FLIP's water line, and this keeps FLIP afloat. The other directions are fixed to check for symmetry.

The LIVE card introduces the current. First node 151 must be freed with the FREE command in the "x" and "y" directions, then FLIP is free to move when the current is initiated. The third word in the CURR command is the flow field scale factor, and in this case it is ".5". This means that the current is 1/2 of what it is in the FLOW card, or 1/2 knot. In this example, the current is constant through the whole water column. In the later examples, the current profile takes the form of figure 3. The last input card is always END.

Output File (sea.9.out):

There is a set of graphs in front of the output file, these are not a part of the Seadyn program. They were produced on the Matlab program, and the method is described in the "Seadyn Uses For Matlab" report. The first graph is a plan view of the mooring in no current. The second graph is an orthogonal view of one mooring leg in no current. There is only one graph for all three legs because the shape is the same for all three in no current. The next graph is the plan view in the half knot current. The current is constant through the water column. The number one mooring leg does not bow at all because it is in the plane perpendicular to the current, it simply stretches. The other two bow symmetrically, as would be expected. The next three graphs show orthogonal views of the mooring legs in the half knot current.

The output has notes to help this explanation as well. The first output is an echo of the input followed by some explanations. Then some nodal generation explanations are listed. The ELEMENT INPUT DATA has zero tension and zero length because in the input a command tells Seadyn to solve for these variables, so no initial variables are listed. It does list the material (mooring line or FLIP), and medium (seawater) codes. The ELEMENT PRE-TENSION DATA on page 9 of the output lists the TENS input card. The CABLE MATERIAL PROPERTY DATA explains the MATE input card. The NODAL POINT DATA SUMMARY lists where the nodes were placed with the codes for wether or not the nodes are fixed in place. The ELEMENT SUMMARY DATA lists the initial length of the elements, which is the length, including stretching, in the no current situation. From this data, the length of the mooring lines can be calculated by multiplying the length of an element by the number of elements in a leg. This is not exact because the elements vary in length, but this variation is quite small, and this method gives a close estimate to the actual length. The ADDITIONAL ELEMENT DATA gives three slopes for each element. The important slope is the third column, the inverse sine of this column gives the angle that the element casts with the horizontal. Thus, the inverse sine of the first element in each leg gives an estimate of the angle between the leg and the sea floor. This is referred to as the "third column inverse sine horizontal" rule. The rest of the output describes the system in a no current situation, and then in the half knot current.

The LOAD CASE PARAMETERS, and the output that follow them, give the global coordinates of the nodes in the present situation, and the tensions in the elements. In the DEAD output, pages 20 through 23 of the output file, the last five nodal positions, and the last four element tensions are important. The last two nodal positions describe FLIP. The three before that describe the last node in each mooring line leg. The last element tension is the tension within FLIP, this can be disregarded, but the three before it are the crux of the problem. These are where the tension that FLIP will feel from each mooring leg is recorded. In this case the tension in each leg will be roughly 3,990 lbs. If this were the real world and a tension meter were at the junction between FLIP and the mooring lines, they would record 3,990 lbs each. These tensions are what are to be manipulated in these trials.

The next LOAD CASE PARAMETER is the LIVE situation with a half knot current. The FLOW FIELD MULTIPLIER is echoed here as ".5". The same style of output as was found in the DEAD output exists. The last five nodal positions and the last four element tensions are the important parts of the output. Here the water line of FLIP has moved 561 ft in the positive "x" direction. Her stern has moved 640 ft in the positive "x" direction, and 11 ft in the positive "z" direction. This produces more of an angle than in later trials because this trial is inaccurate; another example of the constant corrections that must take place when operating Seadyn. The tensions in elements 149 and 150 have dropped with the no current, they are now 3,738 lbs each. This is because they are down stream, and the number one mooring leg is bruiting the force of the current. Its tension at its junction with FLIP is up to 7,433 lbs. This is found in the tension for element 148, the mooring leg 1/FLIP interface.

The important output is at the end of the output file which illustrates the need to go directly to the end of the output file when analyzing data. This is a simple example, the rest of the example outputs have arrays in them, and are far more complicated. They have less elements than this however, because the idea behind this trial was to produce as nice a curve as possible in the mooring line graphs. The more elements, the smaller they are, and thus more accurate the angles and tensions are produced. This trial has 50 elements per mooring line leg. The rest of the examples have either 14 or 17 elements per leg, and 14 or 17 elements per array.

sea.9.in

```
Test Case with 151 elements. $
* sea.9.in
PROB
152,151,-3,1
FLUID
,1
NODE
1,,-16000,0,-12000,3,3,3         * mooring line 1
2,,8000,13856,-12000,3,3,3       * mooring line 2
3,,8000,-13856,-12000,3,3,3      * mooring line 3
151,,0,0,0,0,0,0                 * FLIP water line
152,,0,0,-300,0,0,0              * FLIP stern
NGEN
49,1,151,3,2,4,1,.1068,2600      * catenary mooring line 1
49,2,151,3,2,5,1,.1068,2600      * line 2
49,3,151,3,2,6,1,.1068,2600      * line 3, 2600 lbs horiz. each
ELEM
1,1,4,,1,0
2,2,5,,1,0
3,3,6,,1,0
4,4,7,,1,0,0
5,5,8,,1,0,0
6,6,9,,1,0,0
7,7,10,,1,0,0
8,8,11,,1,0,0
9,9,12,,1,0,0
10,10,13,,1,0,0
11,11,14,,1,0,0
12,12,15,,1,0,0
13,13,16,,1,0,0
14,14,17,,1,0,0
15,15,18,,1,0,0
16,16,19,,1,0,0
17,17,20,,1,0,0
18,18,21,,1,0,0
19,19,22,,1,0,0
20,20,23,,1,0,0
21,21,24,,1,0,0
22,22,25,,1,0,0
23,23,26,,1,0,0
24,24,27,,1,0,0
25,25,28,,1,0,0
26,26,29,,1,0,0
27,27,30,,1,0,0
28,28,31,,1,0,0
29,29,32,,1,0,0
30,30,33,,1,0,0
31,31,34,,1,0,0
32,32,35,,1,0,0
33,33,36,,1,0,0
34,34,37,,1,0,0
35,35,38,,1,0,0
36,36,39,,1,0,0
37,37,40,,1,0,0
38,38,41,,1,0,0
39,39,42,,1,0,0
40,40,43,,1,0,0
41,41,44,,1,0,0
42,42,45,,1,0,0
43,43,46,,1,0,0
```

global coordinates

catenary description
horiz. tension

word 1: element
word 2: first node

word 3: second node
word 5: material

```
44,44,47,,1,0,0
45,45,48,,1,0,0
46,46,49,,1,0,0
47,47,50,,1,0,0
48,48,51,,1,0,0
49,49,52,,1,0,0
50,50,53,,1,0,0
51,51,54,,1,0,0
52,52,55,,1,0,0
53,53,56,,1,0,0
54,54,57,,1,0,0
55,55,58,,1,0,0
56,56,59,,1,0,0
57,57,60,,1,0,0
58,58,61,,1,0,0
59,59,62,,1,0,0
60,60,63,,1,0,0
61,61,64,,1,0,0
62,62,65,,1,0,0
63,63,66,,1,0,0
64,64,67,,1,0,0
65,65,68,,1,0,0
66,66,69,,1,0,0
67,67,70,,1,0,0
68,68,71,,1,0,0
69,69,72,,1,0,0
70,70,73,,1,0,0
71,71,74,,1,0,0
72,72,75,,1,0,0
73,73,76,,1,0,0
74,74,77,,1,0,0
75,75,78,,1,0,0
76,76,79,,1,0,0
77,77,80,,1,0,0
78,78,81,,1,0,0
79,79,82,,1,0,0
80,80,83,,1,0,0
81,81,84,,1,0,0
82,82,85,,1,0,0
83,83,86,,1,0,0
84,84,87,,1,0,0
85,85,88,,1,0,0
86,86,89,,1,0,0
87,87,90,,1,0,0
88,88,91,,1,0,0
89,89,92,,1,0,0
90,90,93,,1,0,0
91,91,94,,1,0,0
92,92,95,,1,0,0
93,93,96,,1,0,0
94,94,97,,1,0,0
95,95,98,,1,0,0
96,96,99,,1,0,0
97,97,100,,1,0,0
98,98,101,,1,0,0
99,99,102,,1,0,0
100,100,103,,1,0,0
101,101,104,,1,0,0
102,102,105,,1,0,0
103,103,106,,1,0,0
```

```
104,104,107,,1,0,0
105,105,108,,1,0,0
106,106,109,,1,0,0
107,107,110,,1,0,0
108,108,111,,1,0,0
109,109,112,,1,0,0
110,110,113,,1,0,0
111,111,114,,1,0,0
112,112,115,,1,0,0
113,113,116,,1,0,0
114,114,117,,1,0,0
115,115,118,,1,0,0
116,116,119,,1,0,0
117,117,120,,1,0,0
118,118,121,,1,0,0
119,119,122,,1,0,0
120,120,123,,1,0,0
121,121,124,,1,0,0
122,122,125,,1,0,0
123,123,126,,1,0,0
124,124,127,,1,0,0
125,125,128,,1,0,0
126,126,129,,1,0,0
127,127,130,,1,0,0
128,128,131,,1,0,0
129,129,132,,1,0,0
130,130,133,,1,0,0
131,131,134,,1,0,0
132,132,135,,1,0,0
133,133,136,,1,0,0
134,134,137,,1,0,0
135,135,138,,1,0,0
136,136,139,,1,0,0
137,137,140,,1,0,0
138,138,141,,1,0,0
139,139,142,,1,0,0
140,140,143,,1,0,0
141,141,144,,1,0,0
142,142,145,,1,0,0
143,143,146,,1,0,0
144,144,147,,1,0,0
145,145,148,,1,0,0
146,146,149,,1,0,0
147,147,150,,1,0,0
148,148,151,,1,0,0
149,149,151,,1,0,0
150,150,151,,1,0,0
151,152,151,,2,0,0
TENS
1,148,3,1                  * from 1 to 148 skipping 3 calculate
2,149,3,2                  * tension from 1.  same for 2 and 3
3,150,3,3
151,151,0,,1
MATE
1,,.125,.1068W9,200000,1   * mooring line
2,,20,15W9,10000000,1      * FLIP
FLOW
1,1,1.688,0,0
DEAD
   FIX,3,1511,1512,1513
```

[redacted]
final node not FLIP
in tension card

[redacted]
current described in
global coordinates

[redacted]
FLIP water line
fixed in x, y, and z

```
LIVE                                            [redacted]
   FREE,1511,1512                               z direction not free
   CURR,1,.5,0                                  1/2 knot water column
END
```

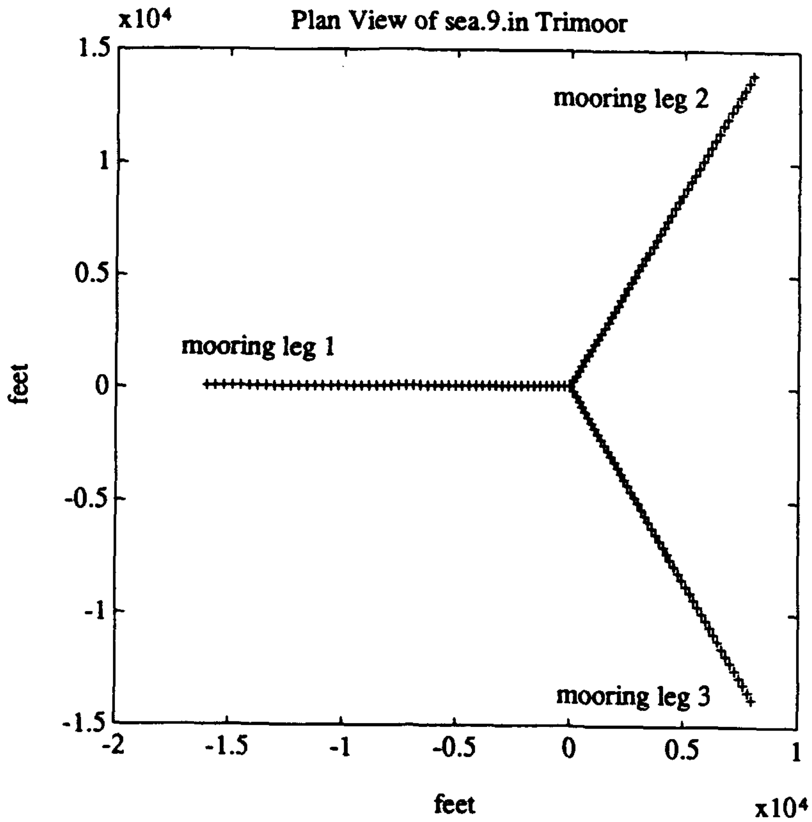

x10⁴
Plan View of sea.9.in Trimoor
1.5
1
0.5
0
-0.5
-1
-1.5
feet
mooring leg 1
mooring leg 2
mooring leg 3
-2
-1.5
-1
-0.5
0
0.5
1
feet
x10⁴

Figure 5a

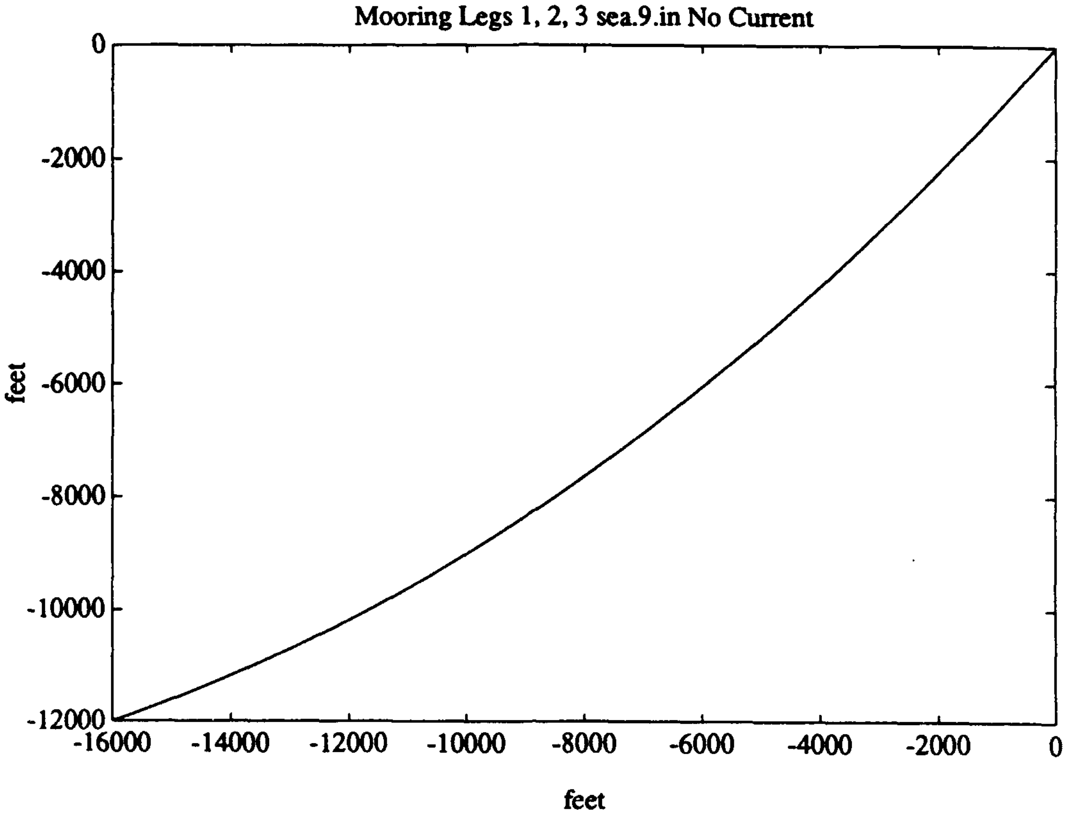
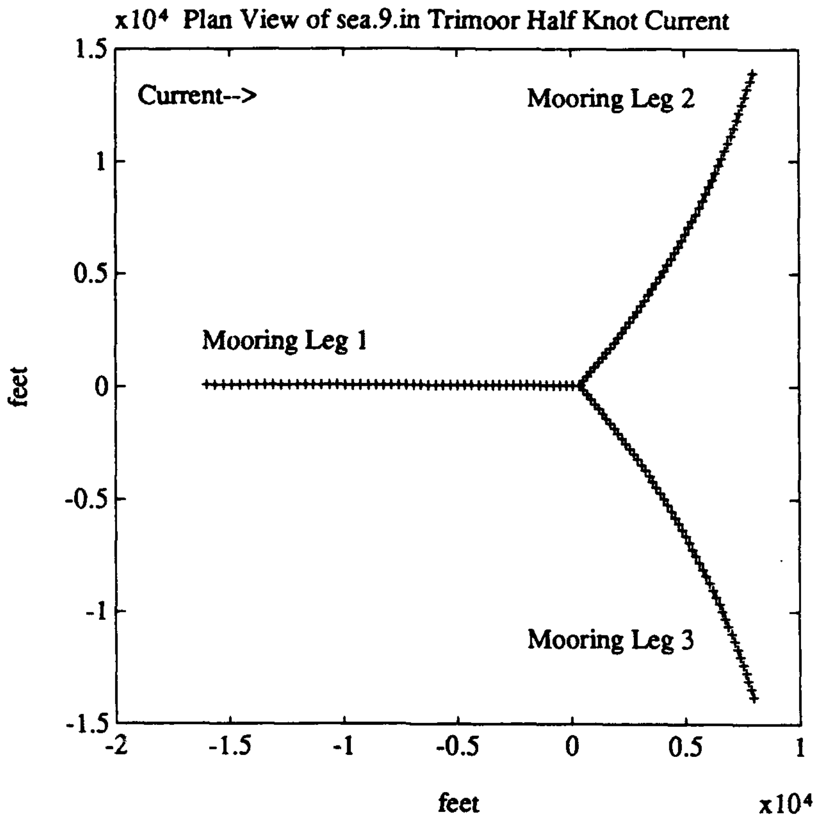



Figure 5a (continued)



x10⁴ Plan View of sea.9.in Trimoor Half Knot Current
Current-->
Mooring Leg 2
Mooring Leg 1
Mooring Leg 3
feet
feet
x10⁴
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-1.5
-1
-0.5
0
0.5
1


Figure 5b

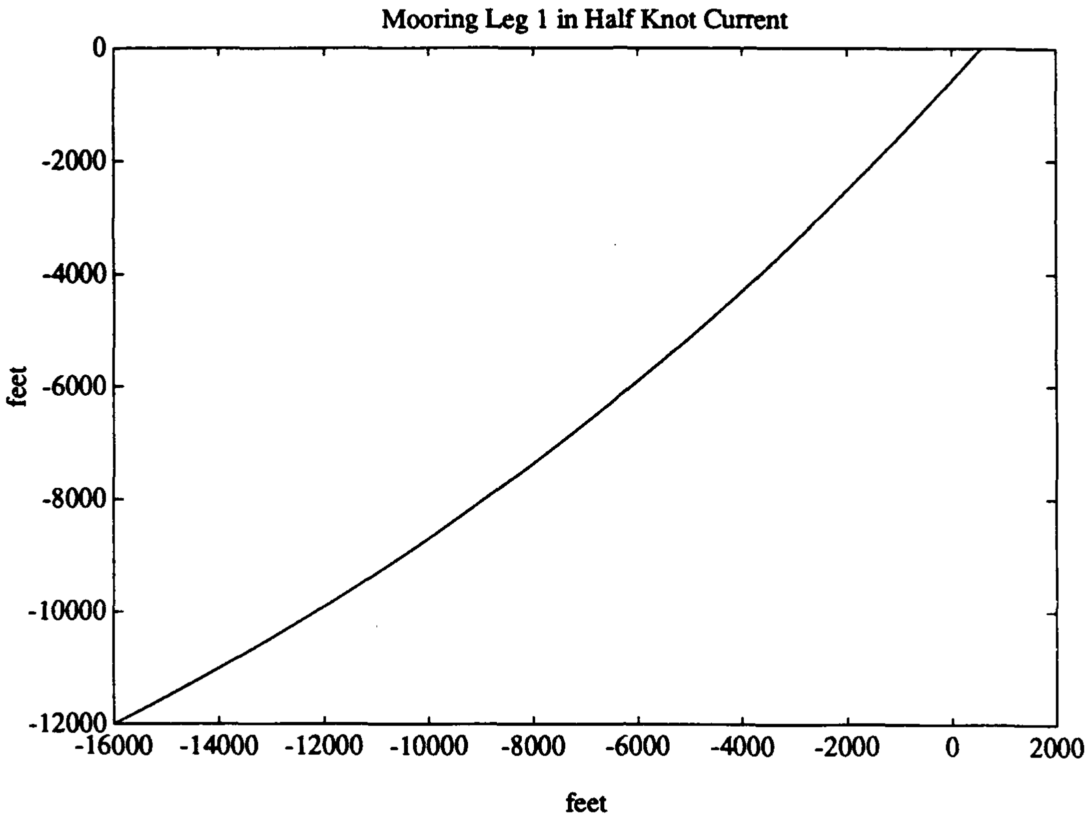



Figure 5b (continued

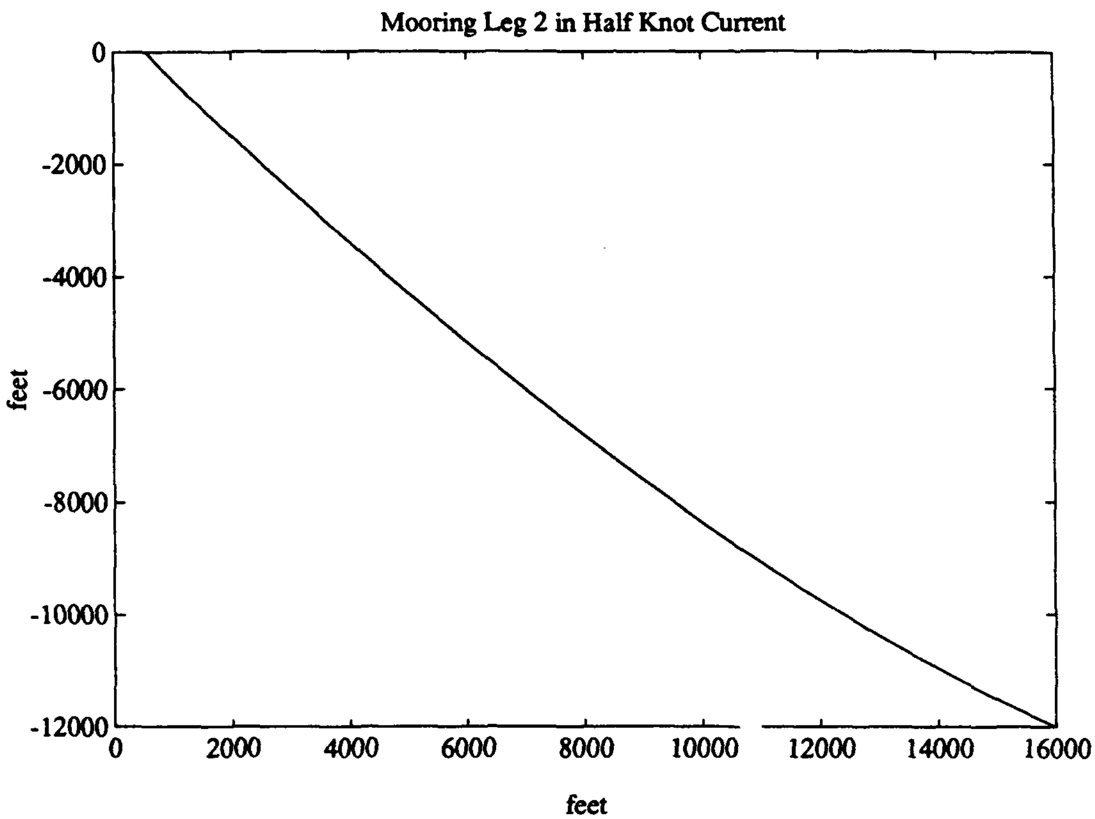

Mooring Leg 2 in Half Knot Current
0
-2000
-4000
-6000
-8000
-10000
-12000
feet
0
2000
4000
6000
8000
10000
12000
14000
16000
feet

Figure 5c

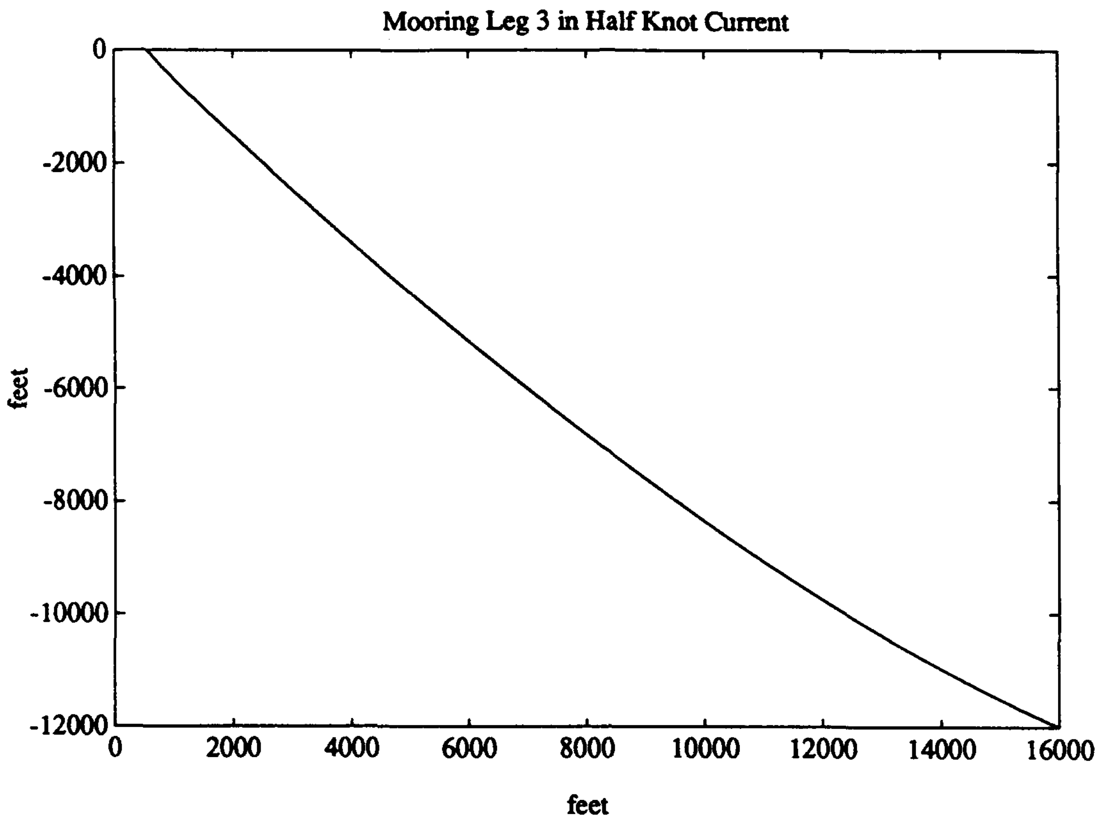



Figure 5c (continued)

```
NONLINEAR CABLE AND MOORING ANALYSIS PROGRAM -- S E A D Y N  9  0        DATE-hour 2.2 *    TIME-/
#
/usr/l
  VERSION    RLW-UNIX-23MAR91   -DP-


  MESSAGE
     DATE
 16JUL90     Modified Material Damping Input
 03JUL90     Lower case keywords enabled
 13JUN90     RESTART FILE HAS BEEN CHANGED
 13JUN90     REVISED CURR RECORD INPUT FORMAT
 20MAR89     THIS VERSION ALLOWS 250 LIMIT LOCATIONS


   LINE   DIRECT LIST OF INPUT DATA FOR SEADYN

     1   Test Case with 151 elements. $
     2   * sea.9.in
     3   PROB
     4   152,151,-3,1
     5   FLUID
     6   ,1
     7   NODE
     8   1,,-16000,0,-12000,3,3,3       * mooring line 1
     9   2,,8000,13856,-12000,3,3,3     * mooring line 2
    10   3,,8000,-13856,-12000,3,3,3    * mooring line 3
    11   151,,0,0,0,0,0,0               * FLIP water line
    12   152,,0,0,-300,0,0,0            * FLIP stern
    13   NGEN
    14   49,1,151,3,2,4,1,.1068,2600    * catenary mooring line 1
    15   49,2,151,3,2,5,1,.1068,2600    * line 2
    16   49,3,151,3,2,6,1,.1068,2600    * line 3, 2600 lbs horiz. each
    17   ELEM
    18   1,1,4,,1,0
    19   2,2,5,,1,0
    20   3,3,6,,1,0
    21   4,4,7,,1,0,0
    22   5,5,8,,1,0,0
    23   6,6,9,,1,0,0
    24   7,7,10,,1,0,0
    25   8,8,11,,1,0,0
    26   9,9,12,,1,0,0
    27   10,10,13,,1,0,0
    28   11,11,14,,1,0,0
    29   12,12,15,,1,0,0
    30   13,13,16,,1,0,0
    31   14,14,17,,1,0,0
    32   15,15,18,,1,0,0
    33   16,16,19,,1,0,0
```

— same input

```
17,17,20,,1,0,0
18,18,21,,1,0,0
19,19,22,,1,0,0
20,20,23,,1,0,0
21,21,24,,1,0,0
22,22,25,,1,0,0
23,23,26,,1,0,0
24,24,27,,1,0,0
25,25,28,,1,0,0
26,26,29,,1,0,0
27,27,30,,1,0,0
28,28,31,,1,0,0
29,29,32,,1,0,0
30,30,33,,1,0,0
31,31,34,,1,0,0
32,32,35,,1,0,0
33,33,36,,1,0,0
34,34,37,,1,0,0
35,35,38,,1,0,0
36,36,39,,1,0,0
37,37,40,,1,0,0
38,38,41,,1,0,0
39,39,42,,1,0,0
40,40,43,,1,0,0
41,41,44,,1,0,0
42,42,45,,1,0,0
43,43,46,,1,0,0
44,44,47,,1,0,0
45,45,48,,1,0,0
46,46,49,,1,0,0
47,47,50,,1,0,0
48,48,51,,1,0,0
49,49,52,,1,0,0
50,50,53,,1,0,0
51,51,54,,1,0,0
52,52,55,,1,0,0
53,53,56,,1,0,0
54,54,57,,1,0,0
55,55,58,,1,0,0
56,56,59,,1,0,0
57,57,60,,1,0,0
58,58,61,,1,0,0
59,59,62,,1,0,0
60,60,63,,1,0,0
61,61,64,,1,0,0
62,62,65,,1,0,0
63,63,66,,1,0,0
64,64,67,,1,0,0
65,65,68,,1,0,0
66,66,69,,1,0,0
67,67,70,,1,0,0
68,68,71,,1,0,0
69,69,72,,1,0,0
70,70,73,,1,0,0
71,71,74,,1,0,0
72,72,75,,1,0,0
```

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73,73,76,,1,0,0
74,74,77,,1,0,0
75,75,78,,1,0,0
76,76,79,,1,0,0
77,77,80,,1,0,0
78,78,81,,1,0,0
79,79,82,,1,0,0
80,80,83,,1,0,0
81,81,84,,1,0,0
82,82,85,,1,0,0
83,83,86,,1,0,0
84,84,87,,1,0,0
85,85,88,,1,0,0
86,86,89,,1,0,0
87,87,90,,1,0,0
88,88,91,,1,0,0
89,89,92,,1,0,0
90,90,93,,1,0,0
91,91,94,,1,0,0
92,92,95,,1,0,0
93,93,96,,1,0,0
94,94,97,,1,0,0
95,95,98,,1,0,0
96,96,99,,1,0,0
97,97,100,,1,0,0
98,98,101,,1,0,0
99,99,102,,1,0,0
100,100,103,,1,0,0
101,101,104,,1,0,0
102,102,105,,1,0,0
103,103,106,,1,0,0
104,104,107,,1,0,0
105,105,108,,1,0,0
106,106,109,,1,0,0
107,107,110,,1,0,0
108,108,111,,1,0,0
109,109,112,,1,0,0
110,110,113,,1,0,0
111,111,114,,1,0,0
112,112,115,,1,0,0
113,113,116,,1,0,0
114,114,117,,1,0,0
115,115,118,,1,0,0
116,116,119,,1,0,0
117,117,120,,1,0,0
118,118,121,,1,0,0
119,119,122,,1,0,0
120,120,123,,1,0,0
121,121,124,,1,0,0
122,122,125,,1,0,0
123,123,126,,1,0,0
124,124,127,,1,0,0
125,125,128,,1,0,0
126,126,129,,1,0,0
127,127,130,,1,0,0
128,128,131,,1,0,0
```

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129,129,132,,1,0,0
130,130,133,,1,0,0
131,131,134,,1,0,0
132,132,135,,1,0,0
133,133,136,,1,0,0
134,134,137,,1,0,0
135,135,138,,1,0,0
136,136,139,,1,0,0
137,137,140,,1,0,0
138,138,141,,1,0,0
139,139,142,,1,0,0
140,140,143,,1,0,0
141,141,144,,1,0,0
142,142,145,,1,0,0
143,143,146,,1,0,0
144,144,147,,1,0,0
145,145,148,,1,0,0
146,146,149,,1,0,0
147,147,150,,1,0,0
148,148,151,,1,0,0
149,149,151,,1,0,0
150,150,151,,1,0,0
151,152,151,,2,0,0
TENS
1,148,3,1                       * from 1 to 148 skipping 3 calculate
2,149,3,2                       * tension from 1.  same for 2 and 3
3,150,3,3
151,151,0,,1
MATE
1,,.125,.1068W9,200000,1       * mooring line
2,,20,15W9,10000000,1           * FLIP
FLOW
1,1,1.688,0,0
DEAD
   FIX,3,1511,1512,1513
LIVE
   FREE,1511,1512
   CURR,1,.5,0
END
```

```
NONLINEAR CABLE AND MOORING ANALYSIS PROGRAM -- S E A D Y N  9  0        DATE-hour 2.2 *    TIME-/
#
/usr/l          PAGE     1
          Test Case with 151 elements.

SEADYN--Test Case with 151 elements.                                    hour 2.2 *    /
#
/usr/l   PAGE     2
```

```
Aug 14 09:37 1991  seadyn.out Page 5

 N E W   P R O B L E M   D A T A

         NUMBER OF    NODES    =      152
         NUMBER OF ELEMENTS    =      151     NBASE  =     20021
         GRAVITY DIRECTION     =       -3     NIBASE =      3039
         INPUT ECHO FLAG       =        1
         SHIP LOAD FILE FLAG   =        0

         GRAVITATIONAL ACCELERATION =   0.321740E+02

 SEADYN--Test Case with 151 elements.                              hour 2.2 *   /
#
/usr/1   PAGE     3

 FLUID MEDIA DEFINITIONS
          INTERFACE DEPTH   KINEMATIC VISCOSITY   SPECIFIC WEIGHT
        1                       0.13000E-04         0.64000E+02
           0.00000E+00

 SEADYN--Test Case with 151 elements.                              hour 2.2 *   /
#
/usr/1   PAGE     4

 NODE DATA
   NODE    CODE       X             Y             Z          CONSTRAINTS
     1      0   -0.16000E+05   0.00000E+00  -0.12000E+05     3     3     3
     2      0    0.80000E+04   0.13856E+05  -0.12000E+05     3     3     3
     3      0    0.80000E+04  -0.13856E+05  -0.12000E+05     3     3     3
   151      0    0.00000E+00   0.00000E+00   0.00000E+00     0     0     0
   152      0    0.00000E+00   0.00000E+00  -0.30000E+03     0     0     0

 SEADYN--Test Case with 151 elements.                              hour 2.2 *   /
#
/usr/1   PAGE     5

      GENERATION OF LINES OF NODES
        NUMBER     BEGIN NODE     END NODE  DIFFERENCE      B.C.  FIRST NODE    CODE        W            H
          49           1           151         3             2        4
                                                                                  1    0.10680E+00    0.26000E+04

C,XSPAN,YSPAN     0.24345E+05    0.16000E+05    0.12000E+05
          49           2           151         3             2        5
                                                                                  1    0.10680E+00    0.26000E+04

C,XSPAN,YSPAN     0.24345E+05    0.16000E+05    0.12000E+05
          49           3           151         3             2        6
                                                                                  1    0.10680E+00    0.26000E+04

C,XSPAN,YSPAN     0.24345E+05    0.16000E+05    0.12000E+05

 SEADYN--Test Case with 151 elements.                              hour 2.2 *   /
#
```

— echoing input

— nodal generation

/usr/l   PAGE   6

ELEMENT INPUT DATA

| EL | N1 | N2 | N3 | MAT | TYPE | FLAG | TENSION | LENGTH | MEDIUM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 4 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 2 | 2 | 5 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 3 | 3 | 6 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 4 | 4 | 7 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 5 | 5 | 8 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 6 | 6 | 9 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 7 | 7 | 10 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 8 | 8 | 11 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 9 | 9 | 12 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 10 | 10 | 13 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 11 | 11 | 14 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 12 | 12 | 15 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 13 | 13 | 16 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 14 | 14 | 17 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 15 | 15 | 18 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 16 | 16 | 19 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 17 | 17 | 20 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 18 | 18 | 21 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 19 | 19 | 22 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 20 | 20 | 23 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 21 | 21 | 24 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 22 | 22 | 25 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 23 | 23 | 26 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 24 | 24 | 27 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 25 | 25 | 28 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 26 | 26 | 29 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 27 | 27 | 30 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 28 | 28 | 31 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 29 | 29 | 32 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 30 | 30 | 33 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 31 | 31 | 34 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 32 | 32 | 35 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 33 | 33 | 36 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 34 | 34 | 37 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 35 | 35 | 38 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 36 | 36 | 39 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 37 | 37 | 40 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 38 | 38 | 41 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 39 | 39 | 42 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 40 | 40 | 43 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 41 | 41 | 44 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 42 | 42 | 45 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 43 | 43 | 46 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 44 | 44 | 47 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 45 | 45 | 48 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 46 | 46 | 49 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 47 | 47 | 50 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 48 | 48 | 51 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 49 | 49 | 52 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 50 | 50 | 53 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 51 | 51 | 54 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 52 | 52 | 55 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |

[redacted]
___length and tensio
zero, let solve

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 53 | 53 | 56 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |

SEADYN--Test Case with 151 elements. hour 2.2 * /

/usr/l PAGE 7

ELEMENT INPUT DATA

| EL | N1 | N2 | N3 | MAT | TYPE | FLAG | TENSION | LENGTH | MEDIUM |
|---|---|---|---|---|---|---|---|---|---|
| 54 | 54 | 57 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 55 | 55 | 58 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 56 | 56 | 59 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 57 | 57 | 60 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 58 | 58 | 61 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 59 | 59 | 62 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 60 | 60 | 63 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 61 | 61 | 64 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 62 | 62 | 65 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 63 | 63 | 66 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 64 | 64 | 67 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 65 | 65 | 68 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 66 | 66 | 69 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 67 | 67 | 70 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 68 | 68 | 71 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 69 | 69 | 72 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 70 | 70 | 73 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 71 | 71 | 74 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 72 | 72 | 75 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 73 | 73 | 76 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 74 | 74 | 77 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 75 | 75 | 78 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 76 | 76 | 79 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 77 | 77 | 80 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 78 | 78 | 81 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 79 | 79 | 82 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 80 | 80 | 83 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 81 | 81 | 84 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 82 | 82 | 85 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 83 | 83 | 86 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 84 | 84 | 87 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 85 | 85 | 88 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 86 | 86 | 89 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 87 | 87 | 90 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 88 | 88 | 91 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 89 | 89 | 92 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 90 | 90 | 93 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 91 | 91 | 94 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 92 | 92 | 95 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 93 | 93 | 96 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 94 | 94 | 97 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 95 | 95 | 98 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 96 | 96 | 99 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 97 | 97 | 100 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 98 | 98 | 101 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 99 | 99 | 102 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 100 | 100 | 103 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 101 | 101 | 104 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 102 | 102 | 105 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 103 | 103 | 106 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 104 | 104 | 107 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 105 | 105 | 108 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 106 | 106 | 109 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |

SEADYN--Test Case with 151 elements. hour 2.2 * /

/usr/l PAGE 8

ELEMENT INPUT DATA

| EL | N1 | N2 | N3 | MAT | TYPE | FLAG | TENSION | LENGTH | MEDIUM |
|---|---|---|---|---|---|---|---|---|---|
| 107 | 107 | 110 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 108 | 108 | 111 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 109 | 109 | 112 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 110 | 110 | 113 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 111 | 111 | 114 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 112 | 112 | 115 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 113 | 113 | 116 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 114 | 114 | 117 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 115 | 115 | 118 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 116 | 116 | 119 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 117 | 117 | 120 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 118 | 118 | 121 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 119 | 119 | 122 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 120 | 120 | 123 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 121 | 121 | 124 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 122 | 122 | 125 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 123 | 123 | 126 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 124 | 124 | 127 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 125 | 125 | 128 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 126 | 126 | 129 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 127 | 127 | 130 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 128 | 128 | 131 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 129 | 129 | 132 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 130 | 130 | 133 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 131 | 131 | 134 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 132 | 132 | 135 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 133 | 133 | 136 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 134 | 134 | 137 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 135 | 135 | 138 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 136 | 136 | 139 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 137 | 137 | 140 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 138 | 138 | 141 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 139 | 139 | 142 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 140 | 140 | 143 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 141 | 141 | 144 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 142 | 142 | 145 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 143 | 143 | 146 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 144 | 144 | 147 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 145 | 145 | 148 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 146 | 146 | 149 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 147 | 147 | 150 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |
| 148 | 148 | 151 | 0 | 1 | 0 | 0 | 0.00000E+00 | 0.00000E+00 | 1 |

```
  149  149  151    0    1    0    0    0.00000E+00    0.00000E+00      1
  150  150  151    0    1    0    0    0.00000E+00    0.00000E+00      1
  151  152  151    0    2    0    0    0.00000E+00    0.00000E+00      1

 SEADYN--Test Case with 151 elements.                                hour 2.2 *   /
#
/usr/1    PAGE     9

 ELEMENT PRE-TENSION DATA
  BEGIN    END  INCR  CODE        TENSION                               __from TENS card
      1    148     3     1     0.00000E+00
      2    149     3     2     0.00000E+00
      3    150     3     3     0.00000E+00
    151    151     1     0     0.10000E+01

 SEADYN--Test Case with 151 elements.                                hour 2.2 *   /
#
/usr/1    PAGE    10

 CABLE MATERIAL PROPERTY DATA
                                                                     __from MATE card
         PROPERTY SET NO. =      1
              DRAG COEF. NO.  -    0
              DRAG DIAMETER            =   0.125000E+00
              WEIGHT PER UNIT LENGTH =   0.106800E+00
              ADDED MASS COEFFICIENT =   0.100000E+01
              REFERENCE MEDIUM CODE  =     1
              ULTIMATE TENSION         =   0.000000E+00

              NO. OF POINTS ON TENSION/STRAIN CURVE =     0

              EXPONENT FORM COEFICIENTS       0.20000E+06    0.10000E+01
              MATERIAL DAMPING RATIOS FOR (CA1,EA1)   0.500000E-02   0.000000E+00

         PROPERTY SET NO. =      2
              DRAG COEF. NO.  -    0
              DRAG DIAMETER            =   0.200000E+02
              WEIGHT PER UNIT LENGTH =   0.150000E+02
              ADDED MASS COEFFICIENT =   0.100000E+01
              REFERENCE MEDIUM CODE  =     1
              ULTIMATE TENSION         =   0.000000E+00

              NO. OF POINTS ON TENSION/STRAIN CURVE =     0

              EXPONENT FORM COEFICIENTS       0.10000E+08    0.10000E+01
              MATERIAL DAMPING RATIOS FOR (CA1,EA1)   0.500000E-02   0.000000E+00

 SEADYN--Test Case with 151 elements.                                hour 2.2 *   /
#
/usr/1    PAGE    11

 FLOW FIELD DATA SETS
    SET  CODE      PARAMETERS
```

Aug 14 09:37 1991 seadyn.out Page 10

1 1 0.16880E+01 0.00000E+00 0.00000E+00

SEADYN--Test Case with 151 elements. hour 2.2 * /

[redacted]

/usr/1 PAGE 12

__where nodes were placed

NODE POINT DATA SUMMARY

| NODE NO. | INITIAL COORDINATES X | Y | Z | FIXITY CODES X | Y | Z | LIMIT SET | BODY NO. | GRAVITY LOADS X | Y | Z | VIRTUAL MASSES X | Y | Z |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | -1.6000E+04 | 0.0000E+00 | -1.2000E+04 | 3 | 3 | 3 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -2.1311E+01 | 1.0404E+01 | 1.0404E+01 | 1.0404E+01 |
| 2 | 8.0000E+03 | 1.3856E+04 | -1.2000E+04 | 3 | 3 | 3 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -2.1311E+01 | 1.0404E+01 | 1.0404E+01 | 1.0404E+01 |
| 3 | 8.0000E+03 | -1.3856E+04 | -1.2000E+04 | 3 | 3 | 3 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -2.1311E+01 | 1.0404E+01 | 1.0404E+01 | 1.0404E+01 |
| 4 | -1.5621E+04 | 0.0000E+00 | -1.1860E+04 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2621E+01 | 2.0808E+01 | 2.0808E+01 | 2.0808E+01 |
| 5 | 7.8103E+03 | 1.3527E+04 | -1.1860E+04 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2620E+01 | 2.0808E+01 | 2.0808E+01 | 2.0808E+01 |
| 6 | 7.8103E+03 | -1.3527E+04 | -1.1860E+04 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2620E+01 | 2.0808E+01 | 2.0808E+01 | 2.0808E+01 |
| 7 | -1.5243E+04 | 0.0000E+00 | -1.1714E+04 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2617E+01 | 2.0806E+01 | 2.0806E+01 | 2.0806E+01 |
| 8 | 7.6216E+03 | 1.3201E+04 | -1.1714E+04 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2617E+01 | 2.0806E+01 | 2.0806E+01 | 2.0806E+01 |
| 9 | 7.6216E+03 | -1.3201E+04 | -1.1714E+04 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2617E+01 | 2.0806E+01 | 2.0806E+01 | 2.0806E+01 |
| 10 | -1.4868E+04 | 0.0000E+00 | -1.1563E+04 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2614E+01 | 2.0805E+01 | 2.0805E+01 | 2.0805E+01 |
| 11 | 7.4339E+03 | 1.2876E+04 | -1.1563E+04 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2614E+01 | 2.0805E+01 | 2.0805E+01 | 2.0805E+01 |
| 12 | 7.4339E+03 | -1.2876E+04 | -1.1563E+04 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2614E+01 | 2.0805E+01 | 2.0805E+01 | 2.0805E+01 |
| 13 | -1.4495E+04 | 0.0000E+00 | -1.1406E+04 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2611E+01 | 2.0803E+01 | 2.0803E+01 | 2.0803E+01 |
| 14 | 7.2474E+03 | 1.2553E+04 | -1.1406E+04 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2610E+01 | 2.0803E+01 | 2.0803E+01 | 2.0803E+01 |
| 15 | 7.2474E+03 | -1.2553E+04 | -1.1406E+04 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2610E+01 | 2.0803E+01 | 2.0803E+01 | 2.0803E+01 |
| 16 | -1.4124E+04 | 0.0000E+00 | -1.1244E+04 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2607E+01 | 2.0801E+01 | 2.0801E+01 | 2.0801E+01 |
| 17 | 7.0620E+03 | 1.2231E+04 | -1.1244E+04 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2607E+01 | 2.0801E+01 | 2.0801E+01 | 2.0801E+01 |
| 18 | 7.0620E+03 | -1.2231E+04 | -1.1244E+04 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2607E+01 | 2.0801E+01 | 2.0801E+01 | 2.0801E+01 |
| 19 | -1.3755E+04 | 0.0000E+00 | -1.1077E+04 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2603E+01 | 2.0800E+01 | 2.0800E+01 | 2.0800E+01 |
| 20 | 6.8777E+03 | 1.1912E+04 | -1.1077E+04 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2603E+01 | 2.0800E+01 | 2.0800E+01 | 2.0800E+01 |
| 21 | 6.8777E+03 | -1.1912E+04 | -1.1077E+04 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2603E+01 | 2.0800E+01 | 2.0800E+01 | 2.0800E+01 |
| 22 | -1.3389E+04 | 0.0000E+00 | -1.0905E+04 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2600E+01 | 2.0798E+01 | 2.0798E+01 | 2.0798E+01 |
| 23 | 6.6946E+03 | 1.1595E+04 | -1.0905E+04 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2599E+01 | 2.0798E+01 | 2.0798E+01 | 2.0798E+01 |
| 24 | 6.6946E+03 | -1.1595E+04 | -1.0905E+04 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2599E+01 | 2.0798E+01 | 2.0798E+01 | 2.0798E+01 |
| 25 | -1.3025E+04 | 0.0000E+00 | -1.0729E+04 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2596E+01 | 2.0796E+01 | 2.0796E+01 | 2.0796E+01 |
| 26 | 6.5127E+03 | 1.1280E+04 | -1.0729E+04 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2595E+01 | 2.0796E+01 | 2.0796E+01 | 2.0796E+01 |
| 27 | 6.5127E+03 | -1.1280E+04 | -1.0729E+04 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2595E+01 | 2.0796E+01 | 2.0796E+01 | 2.0796E+01 |
| 28 | -1.2664E+04 | 0.0000E+00 | -1.0547E+04 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2592E+01 | 2.0794E+01 | 2.0794E+01 | 2.0794E+01 |
| 29 | 6.3319E+03 | 1.0967E+04 | -1.0547E+04 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2591E+01 | 2.0794E+01 | 2.0794E+01 | 2.0794E+01 |
| 30 | 6.3319E+03 | -1.0967E+04 | -1.0547E+04 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2591E+01 | 2.0794E+01 | 2.0794E+01 | 2.0794E+01 |
| 31 | -1.2305E+04 | 0.0000E+00 | -1.0360E+04 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2588E+01 | 2.0792E+01 | 2.0792E+01 | 2.0792E+01 |
| 32 | 6.1524E+03 | 1.0656E+04 | -1.0360E+04 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2587E+01 | 2.0792E+01 | 2.0792E+01 | 2.0792E+01 |
| 33 | 6.1524E+03 | -1.0656E+04 | -1.0360E+04 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2587E+01 | 2.0792E+01 | 2.0792E+01 | 2.0792E+01 |
| 34 | -1.1948E+04 | 0.0000E+00 | -1.0169E+04 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2583E+01 | 2.0790E+01 | 2.0790E+01 | 2.0790E+01 |
| 35 | 5.9741E+03 | 1.0347E+04 | -1.0169E+04 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2583E+01 | 2.0790E+01 | 2.0790E+01 | 2.0790E+01 |
| 36 | 5.9741E+03 | -1.0347E+04 | -1.0169E+04 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2583E+01 | 2.0790E+01 | 2.0790E+01 | 2.0790E+01 |
| 37 | -1.1594E+04 | 0.0000E+00 | -9.9735E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2579E+01 | 2.0788E+01 | 2.0788E+01 | 2.0788E+01 |
| 38 | 5.7971E+03 | 1.0041E+04 | -9.9735E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2579E+01 | 2.0788E+01 | 2.0788E+01 | 2.0788E+01 |
| 39 | 5.7971E+03 | -1.0041E+04 | -9.9735E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2579E+01 | 2.0788E+01 | 2.0788E+01 | 2.0788E+01 |
| 40 | -1.1243E+04 | 0.0000E+00 | -9.7733E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2575E+01 | 2.0786E+01 | 2.0786E+01 | 2.0786E+01 |
| 41 | 5.6213E+03 | 9.7360E+03 | -9.7733E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2574E+01 | 2.0785E+01 | 2.0785E+01 | 2.0785E+01 |
| 42 | 5.6213E+03 | -9.7360E+03 | -9.7733E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2574E+01 | 2.0785E+01 | 2.0785E+01 | 2.0785E+01 |
| 43 | -1.0894E+04 | 0.0000E+00 | -9.5688E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2570E+01 | 2.0783E+01 | 2.0783E+01 | 2.0783E+01 |
| 44 | 5.4467E+03 | 9.4337E+03 | -9.5688E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2570E+01 | 2.0783E+01 | 2.0783E+01 | 2.0783E+01 |
| 45 | 5.4467E+03 | -9.4337E+03 | -9.5688E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2570E+01 | 2.0783E+01 | 2.0783E+01 | 2.0783E+01 |
| 46 | -1.0547E+04 | 0.0000E+00 | -9.3601E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2566E+01 | 2.0781E+01 | 2.0781E+01 | 2.0781E+01 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 47 | 5.2734E+03 | 9.1336E+03 | -9.3600E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2565E+01 | 2.0781E+01 | 2.0781E+01 | 2.0781E+01 |
| 48 | 5.2734E+03 | -9.1336E+03 | -9.3600E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2565E+01 | 2.0781E+01 | 2.0781E+01 | 2.0781E+01 |
| 49 | -1.0203E+04 | 0.0000E+00 | -9.1471E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2561E+01 | 2.0779E+01 | 2.0779E+01 | 2.0779E+01 |
| 50 | 5.1014E+03 | 8.8357E+03 | -9.1471E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2561E+01 | 2.0779E+01 | 2.0779E+01 | 2.0779E+01 |
| 51 | 5.1014E+03 | -8.8357E+03 | -9.1471E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2561E+01 | 2.0779E+01 | 2.0779E+01 | 2.0779E+01 |
| 52 | -9.8615E+03 | 0.0000E+00 | -8.9300E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2556E+01 | 2.0777E+01 | 2.0777E+01 | 2.0777E+01 |

SEADYN--Test Case with 151 elements. hour 2.2 * /

/usr/1 PAGE 13

NODE POINT DATA SUMMARY

| NODE NO. | INITIAL COORDINATES X | Y | Z | FIXITY CODES X | Y | Z | LIMIT SET | BODY NO. | GRAVITY LOADS X | Y | Z | VIRTUAL MASSES X | Y | Z |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 53 | 4.9307E+03 | 8.5400E+03 | -8.9300E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2556E+01 | 2.0776E+01 | 2.0776E+01 | 2.0776E+01 |
| 54 | 4.9307E+03 | -8.5400E+03 | -8.9300E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2556E+01 | 2.0776E+01 | 2.0776E+01 | 2.0776E+01 |
| 55 | -9.5227E+03 | 0.0000E+00 | -8.7090E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2551E+01 | 2.0774E+01 | 2.0774E+01 | 2.0774E+01 |
| 56 | 4.7613E+03 | 8.2466E+03 | -8.7090E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2551E+01 | 2.0774E+01 | 2.0774E+01 | 2.0774E+01 |
| 57 | 4.7613E+03 | -8.2466E+03 | -8.7090E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2551E+01 | 2.0774E+01 | 2.0774E+01 | 2.0774E+01 |
| 58 | -9.1864E+03 | 0.0000E+00 | -8.4840E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2546E+01 | 2.0772E+01 | 2.0772E+01 | 2.0772E+01 |
| 59 | 4.5932E+03 | 7.9553E+03 | -8.4840E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2546E+01 | 2.0772E+01 | 2.0772E+01 | 2.0772E+01 |
| 60 | 4.5932E+03 | -7.9553E+03 | -8.4840E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2546E+01 | 2.0772E+01 | 2.0772E+01 | 2.0772E+01 |
| 61 | -8.8527E+03 | 0.0000E+00 | -8.2553E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2541E+01 | 2.0769E+01 | 2.0769E+01 | 2.0769E+01 |
| 62 | 4.4263E+03 | 7.6664E+03 | -8.2553E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2541E+01 | 2.0769E+01 | 2.0769E+01 | 2.0769E+01 |
| 63 | 4.4263E+03 | -7.6664E+03 | -8.2553E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2541E+01 | 2.0769E+01 | 2.0769E+01 | 2.0769E+01 |
| 64 | -8.5216E+03 | 0.0000E+00 | -8.0228E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2536E+01 | 2.0767E+01 | 2.0767E+01 | 2.0767E+01 |
| 65 | 4.2607E+03 | 7.3796E+03 | -8.0228E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2536E+01 | 2.0767E+01 | 2.0767E+01 | 2.0767E+01 |
| 66 | 4.2607E+03 | -7.3796E+03 | -8.0228E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2536E+01 | 2.0767E+01 | 2.0767E+01 | 2.0767E+01 |
| 67 | -8.1931E+03 | 0.0000E+00 | -7.7866E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2531E+01 | 2.0764E+01 | 2.0764E+01 | 2.0764E+01 |
| 68 | 4.0965E+03 | 7.0951E+03 | -7.7866E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2531E+01 | 2.0764E+01 | 2.0764E+01 | 2.0764E+01 |
| 69 | 4.0965E+03 | -7.0951E+03 | -7.7866E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2531E+01 | 2.0764E+01 | 2.0764E+01 | 2.0764E+01 |
| 70 | -7.8672E+03 | 0.0000E+00 | -7.5469E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2526E+01 | 2.0762E+01 | 2.0762E+01 | 2.0762E+01 |
| 71 | 3.9335E+03 | 6.8129E+03 | -7.5469E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2525E+01 | 2.0762E+01 | 2.0762E+01 | 2.0762E+01 |
| 72 | 3.9335E+03 | -6.8129E+03 | -7.5469E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2525E+01 | 2.0762E+01 | 2.0762E+01 | 2.0762E+01 |
| 73 | -7.5438E+03 | 0.0000E+00 | -7.3038E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2520E+01 | 2.0759E+01 | 2.0759E+01 | 2.0759E+01 |
| 74 | 3.7718E+03 | 6.5328E+03 | -7.3038E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2520E+01 | 2.0759E+01 | 2.0759E+01 | 2.0759E+01 |
| 75 | 3.7718E+03 | -6.5328E+03 | -7.3038E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2520E+01 | 2.0759E+01 | 2.0759E+01 | 2.0759E+01 |
| 76 | -7.2231E+03 | 0.0000E+00 | -7.0572E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2515E+01 | 2.0756E+01 | 2.0756E+01 | 2.0756E+01 |
| 77 | 3.6115E+03 | 6.2550E+03 | -7.0572E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2515E+01 | 2.0756E+01 | 2.0756E+01 | 2.0756E+01 |
| 78 | 3.6115E+03 | -6.2550E+03 | -7.0572E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2515E+01 | 2.0756E+01 | 2.0756E+01 | 2.0756E+01 |
| 79 | -6.9049E+03 | 0.0000E+00 | -6.8073E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2509E+01 | 2.0754E+01 | 2.0754E+01 | 2.0754E+01 |
| 80 | 3.4524E+03 | 5.9795E+03 | -6.8073E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2509E+01 | 2.0754E+01 | 2.0754E+01 | 2.0754E+01 |
| 81 | 3.4524E+03 | -5.9795E+03 | -6.8073E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2509E+01 | 2.0754E+01 | 2.0754E+01 | 2.0754E+01 |
| 82 | -6.5892E+03 | 0.0000E+00 | -6.5542E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2504E+01 | 2.0751E+01 | 2.0751E+01 | 2.0751E+01 |
| 83 | 3.2945E+03 | 5.7061E+03 | -6.5542E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2504E+01 | 2.0751E+01 | 2.0751E+01 | 2.0751E+01 |
| 84 | 3.2945E+03 | -5.7061E+03 | -6.5542E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2504E+01 | 2.0751E+01 | 2.0751E+01 | 2.0751E+01 |
| 85 | -6.2761E+03 | 0.0000E+00 | -6.2980E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2498E+01 | 2.0748E+01 | 2.0748E+01 | 2.0748E+01 |
| 86 | 3.1380E+03 | 5.4350E+03 | -6.2980E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2498E+01 | 2.0748E+01 | 2.0748E+01 | 2.0748E+01 |
| 87 | 3.1380E+03 | -5.4350E+03 | -6.2980E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2498E+01 | 2.0748E+01 | 2.0748E+01 | 2.0748E+01 |
| 88 | -5.9656E+03 | 0.0000E+00 | -6.0386E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2493E+01 | 2.0745E+01 | 2.0745E+01 | 2.0745E+01 |
| 89 | 2.9827E+03 | 5.1661E+03 | -6.0386E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2492E+01 | 2.0745E+01 | 2.0745E+01 | 2.0745E+01 |
| 90 | 2.9827E+03 | -5.1661E+03 | -6.0386E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2492E+01 | 2.0745E+01 | 2.0745E+01 | 2.0745E+01 |
| 91 | -5.6576E+03 | 0.0000E+00 | -5.7763E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2487E+01 | 2.0743E+01 | 2.0743E+01 | 2.0743E+01 |
| 92 | 2.8287E+03 | 4.8994E+03 | -5.7763E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2487E+01 | 2.0743E+01 | 2.0743E+01 | 2.0743E+01 |
| 93 | 2.8287E+03 | -4.8994E+03 | -5.7763E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2487E+01 | 2.0743E+01 | 2.0743E+01 | 2.0743E+01 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 94 | -5.3521E+03 | 0.0000E+00 | -5.5110E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2481E+01 | 2.0740E+01 | 2.0740E+01 | 2.0740E+01 |
| 95 | 2.6760E+03 | 4.6348E+03 | -5.5110E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2481E+01 | 2.0740E+01 | 2.0740E+01 | 2.0740E+01 |
| 96 | 2.6760E+03 | -4.6348E+03 | -5.5110E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2481E+01 | 2.0740E+01 | 2.0740E+01 | 2.0740E+01 |
| 97 | -5.0492E+03 | 0.0000E+00 | -5.2429E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2475E+01 | 2.0737E+01 | 2.0737E+01 | 2.0737E+01 |
| 98 | 2.5245E+03 | 4.3724E+03 | -5.2429E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2475E+01 | 2.0737E+01 | 2.0737E+01 | 2.0737E+01 |
| 99 | 2.5245E+03 | -4.3724E+03 | -5.2429E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2475E+01 | 2.0737E+01 | 2.0737E+01 | 2.0737E+01 |
| 100 | -4.7487E+03 | 0.0000E+00 | -4.9720E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2469E+01 | 2.0734E+01 | 2.0734E+01 | 2.0734E+01 |
| 101 | 2.3743E+03 | 4.1122E+03 | -4.9720E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2469E+01 | 2.0734E+01 | 2.0734E+01 | 2.0734E+01 |
| 102 | 2.3743E+03 | -4.1122E+03 | -4.9720E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2469E+01 | 2.0734E+01 | 2.0734E+01 | 2.0734E+01 |
| 103 | -4.4507E+03 | 0.0000E+00 | -4.6984E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2463E+01 | 2.0731E+01 | 2.0731E+01 | 2.0731E+01 |
| 104 | 2.2252E+03 | 3.8541E+03 | -4.6983E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2463E+01 | 2.0731E+01 | 2.0731E+01 | 2.0731E+01 |

SEADYN--Test Case with 151 elements. hour 2.2 * /
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/usr/1 PAGE 14

NODE POINT DATA SUMMARY

| NODE NO. | INITIAL COORDINATES X | Y | Z | FIXITY CODES X | Y | Z | LIMIT SET | BODY NO. | GRAVITY LOADS X | Y | Z | VIRTUAL MASSES X | Y | Z |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 105 | 2.2252E+03 | -3.8541E+03 | -4.6983E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2463E+01 | 2.0731E+01 | 2.0731E+01 | 2.0731E+01 |
| 106 | -4.1551E+03 | 0.0000E+00 | -4.4221E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2457E+01 | 2.0728E+01 | 2.0728E+01 | 2.0728E+01 |
| 107 | 2.0775E+03 | 3.5982E+03 | -4.4220E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2457E+01 | 2.0728E+01 | 2.0728E+01 | 2.0728E+01 |
| 108 | 2.0775E+03 | -3.5982E+03 | -4.4220E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2457E+01 | 2.0728E+01 | 2.0728E+01 | 2.0728E+01 |
| 109 | -3.8620E+03 | 0.0000E+00 | -4.1432E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2451E+01 | 2.0725E+01 | 2.0725E+01 | 2.0725E+01 |
| 110 | 1.9309E+03 | 3.3444E+03 | -4.1432E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2451E+01 | 2.0725E+01 | 2.0725E+01 | 2.0725E+01 |
| 111 | 1.9309E+03 | -3.3444E+03 | -4.1432E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2451E+01 | 2.0725E+01 | 2.0725E+01 | 2.0725E+01 |
| 112 | -3.5713E+03 | 0.0000E+00 | -3.8618E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2445E+01 | 2.0722E+01 | 2.0722E+01 | 2.0722E+01 |
| 113 | 1.7856E+03 | 3.0926E+03 | -3.8618E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2445E+01 | 2.0722E+01 | 2.0722E+01 | 2.0722E+01 |
| 114 | 1.7856E+03 | -3.0926E+03 | -3.8618E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2445E+01 | 2.0722E+01 | 2.0722E+01 | 2.0722E+01 |
| 115 | -3.2831E+03 | 0.0000E+00 | -3.5779E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2439E+01 | 2.0719E+01 | 2.0719E+01 | 2.0719E+01 |
| 116 | 1.6414E+03 | 2.8430E+03 | -3.5779E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2439E+01 | 2.0719E+01 | 2.0719E+01 | 2.0719E+01 |
| 117 | 1.6414E+03 | -2.8430E+03 | -3.5779E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2439E+01 | 2.0719E+01 | 2.0719E+01 | 2.0719E+01 |
| 118 | -2.9972E+03 | 0.0000E+00 | -3.2916E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2432E+01 | 2.0716E+01 | 2.0716E+01 | 2.0716E+01 |
| 119 | 1.4985E+03 | 2.5954E+03 | -3.2916E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2432E+01 | 2.0716E+01 | 2.0716E+01 | 2.0716E+01 |
| 120 | 1.4985E+03 | -2.5954E+03 | -3.2916E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2432E+01 | 2.0716E+01 | 2.0716E+01 | 2.0716E+01 |
| 121 | -2.7136E+03 | 0.0000E+00 | -3.0030E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2426E+01 | 2.0713E+01 | 2.0713E+01 | 2.0713E+01 |
| 122 | 1.3567E+03 | 2.3498E+03 | -3.0030E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2426E+01 | 2.0713E+01 | 2.0713E+01 | 2.0713E+01 |
| 123 | 1.3567E+03 | -2.3498E+03 | -3.0030E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2426E+01 | 2.0713E+01 | 2.0713E+01 | 2.0713E+01 |
| 124 | -2.4325E+03 | 0.0000E+00 | -2.7121E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2420E+01 | 2.0710E+01 | 2.0710E+01 | 2.0710E+01 |
| 125 | 1.2161E+03 | 2.1063E+03 | -2.7121E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2420E+01 | 2.0710E+01 | 2.0710E+01 | 2.0710E+01 |
| 126 | 1.2161E+03 | -2.1063E+03 | -2.7121E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2420E+01 | 2.0710E+01 | 2.0710E+01 | 2.0710E+01 |
| 127 | -2.1536E+03 | 0.0000E+00 | -2.4190E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2413E+01 | 2.0707E+01 | 2.0707E+01 | 2.0707E+01 |
| 128 | 1.0767E+03 | 1.8648E+03 | -2.4190E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2413E+01 | 2.0707E+01 | 2.0707E+01 | 2.0707E+01 |
| 129 | 1.0767E+03 | -1.8648E+03 | -2.4190E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2413E+01 | 2.0707E+01 | 2.0707E+01 | 2.0707E+01 |
| 130 | -1.8771E+03 | 0.0000E+00 | -2.1237E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2407E+01 | 2.0704E+01 | 2.0704E+01 | 2.0704E+01 |
| 131 | 9.3842E+02 | 1.6253E+03 | -2.1237E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2407E+01 | 2.0704E+01 | 2.0704E+01 | 2.0704E+01 |
| 132 | 9.3842E+02 | -1.6253E+03 | -2.1237E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2407E+01 | 2.0704E+01 | 2.0704E+01 | 2.0704E+01 |
| 133 | -1.6028E+03 | 0.0000E+00 | -1.8263E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2400E+01 | 2.0701E+01 | 2.0701E+01 | 2.0701E+01 |
| 134 | 8.0128E+02 | 1.3878E+03 | -1.8263E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2400E+01 | 2.0700E+01 | 2.0700E+01 | 2.0700E+01 |
| 135 | 8.0128E+02 | -1.3878E+03 | -1.8263E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2400E+01 | 2.0700E+01 | 2.0700E+01 | 2.0700E+01 |
| 136 | -1.3308E+03 | 0.0000E+00 | -1.5268E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2394E+01 | 2.0697E+01 | 2.0697E+01 | 2.0697E+01 |
| 137 | 6.6527E+02 | 1.1523E+03 | -1.5268E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2394E+01 | 2.0697E+01 | 2.0697E+01 | 2.0697E+01 |
| 138 | 6.6527E+02 | -1.1523E+03 | -1.5268E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2394E+01 | 2.0697E+01 | 2.0697E+01 | 2.0697E+01 |
| 139 | -1.0610E+03 | 0.0000E+00 | -1.2253E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2387E+01 | 2.0694E+01 | 2.0694E+01 | 2.0694E+01 |
| 140 | 5.3039E+02 | 9.1863E+02 | -1.2253E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2387E+01 | 2.0694E+01 | 2.0694E+01 | 2.0694E+01 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 141 | 5.3039E+02 | -9.1863E+02 | -1.2253E+03 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2387E+01 | 2.0694E+01 | 2.0694E+01 | 2.0694E+01 |
| 142 | -7.9345E+02 | 0.0000E+00 | -9.2178E+02 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2381E+01 | 2.0691E+01 | 2.0691E+01 | 2.0691E+01 |
| 143 | 3.9661E+02 | 6.8692E+02 | -9.2178E+02 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2381E+01 | 2.0691E+01 | 2.0691E+01 | 2.0691E+01 |
| 144 | 3.9661E+02 | -6.8692E+02 | -9.2178E+02 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2381E+01 | 2.0691E+01 | 2.0691E+01 | 2.0691E+01 |
| 145 | -5.2809E+02 | 0.0000E+00 | -6.1638E+02 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2374E+01 | 2.0688E+01 | 2.0688E+01 | 2.0688E+01 |
| 146 | 2.6392E+02 | 4.5712E+02 | -6.1638E+02 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2374E+01 | 2.0688E+01 | 2.0688E+01 | 2.0688E+01 |
| 147 | 2.6392E+02 | -4.5712E+02 | -6.1638E+02 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2374E+01 | 2.0688E+01 | 2.0688E+01 | 2.0688E+01 |
| 148 | -2.6490E+02 | 0.0000E+00 | -3.0910E+02 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2502E+01 | 2.0750E+01 | 2.0750E+01 | 2.0750E+01 |
| 149 | 1.3233E+02 | 2.2919E+02 | -3.0910E+02 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2493E+01 | 2.0746E+01 | 2.0746E+01 | 2.0746E+01 |
| 150 | 1.3233E+02 | -2.2919E+02 | -3.0910E+02 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -4.2493E+01 | 2.0746E+01 | 2.0746E+01 | 2.0746E+01 |
| 151 | 0.0000E+00 | 0.0000E+00 | 0.0000E+00 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -2.3139E+03 | 1.8758E+05 | 1.8758E+05 | 1.8758E+05 |
| 152 | 0.0000E+00 | 0.0000E+00 | -3.0000E+02 | 0 | 0 | 0 | 0 | 0 | 0.0000E+00 | 0.0000E+00 | -2.2500E+03 | 1.8755E+05 | 1.8755E+05 | 1.8755E+05 |

TOTAL LOAD REPRESENTED BY GRAVITY VECTOR -1.087687E+04

CENTER OF LOAD FOR HORIZ PLANE(X,Y) -3.178092E-02 0.000000E+00

SEADYN--Test Case with 151 elements. hour 2.2 * /

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/usr/1 PAGE 15

ELEMENT SUMMARY DATA

| ELT NO. | CONNECTION N1 | N2 | DATA N3 | MAT NO. | COMP CODE | MED. CODE | INITIAL TENSION | UNSTRETCHED LENGTH | INITIAL LENGTH | RESIDUAL MASS |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 4 | | 1 | 0 | 1 | 2.77209E+03 | 3.99084E+02 | 4.04578E+02 | 4.87102E+00 |
| 2 | 2 | 5 | | 1 | 0 | 1 | 2.77210E+03 | 3.99083E+02 | 4.04576E+02 | 4.87100E+00 |
| 3 | 3 | 6 | | 1 | 0 | 1 | 2.77210E+03 | 3.99083E+02 | 4.04576E+02 | 4.87100E+00 |
| 4 | 4 | 7 | | 1 | 0 | 1 | 2.78737E+03 | 3.99055E+02 | 4.04578E+02 | 4.87066E+00 |
| 5 | 5 | 8 | | 1 | 0 | 1 | 2.78738E+03 | 3.99053E+02 | 4.04576E+02 | 4.87064E+00 |
| 6 | 6 | 9 | | 1 | 0 | 1 | 2.78738E+03 | 3.99053E+02 | 4.04576E+02 | 4.87064E+00 |
| 7 | 7 | 10 | | 1 | 0 | 1 | 2.80324E+03 | 3.99024E+02 | 4.04578E+02 | 4.87028E+00 |
| 8 | 8 | 11 | | 1 | 0 | 1 | 2.80324E+03 | 3.99022E+02 | 4.04577E+02 | 4.87026E+00 |
| 9 | 9 | 12 | | 1 | 0 | 1 | 2.80324E+03 | 3.99022E+02 | 4.04577E+02 | 4.87026E+00 |
| 10 | 10 | 13 | | 1 | 0 | 1 | 2.81967E+03 | 3.98992E+02 | 4.04578E+02 | 4.86989E+00 |
| 11 | 11 | 14 | | 1 | 0 | 1 | 2.81968E+03 | 3.98991E+02 | 4.04577E+02 | 4.86987E+00 |
| 12 | 12 | 15 | | 1 | 0 | 1 | 2.81968E+03 | 3.98991E+02 | 4.04577E+02 | 4.86987E+00 |
| 13 | 13 | 16 | | 1 | 0 | 1 | 2.83667E+03 | 3.98959E+02 | 4.04578E+02 | 4.86949E+00 |
| 14 | 14 | 17 | | 1 | 0 | 1 | 2.83668E+03 | 3.98958E+02 | 4.04577E+02 | 4.86947E+00 |
| 15 | 15 | 18 | | 1 | 0 | 1 | 2.83668E+03 | 3.98958E+02 | 4.04577E+02 | 4.86947E+00 |
| 16 | 16 | 19 | | 1 | 0 | 1 | 2.85423E+03 | 3.98925E+02 | 4.04579E+02 | 4.86908E+00 |
| 17 | 17 | 20 | | 1 | 0 | 1 | 2.85423E+03 | 3.98924E+02 | 4.04577E+02 | 4.86906E+00 |
| 18 | 18 | 21 | | 1 | 0 | 1 | 2.85423E+03 | 3.98924E+02 | 4.04577E+02 | 4.86906E+00 |
| 19 | 19 | 22 | | 1 | 0 | 1 | 2.87232E+03 | 3.98890E+02 | 4.04579E+02 | 4.86865E+00 |
| 20 | 20 | 23 | | 1 | 0 | 1 | 2.87233E+03 | 3.98889E+02 | 4.04577E+02 | 4.86863E+00 |
| 21 | 21 | 24 | | 1 | 0 | 1 | 2.87233E+03 | 3.98889E+02 | 4.04577E+02 | 4.86863E+00 |
| 22 | 22 | 25 | | 1 | 0 | 1 | 2.89095E+03 | 3.98854E+02 | 4.04579E+02 | 4.86821E+00 |
| 23 | 23 | 26 | | 1 | 0 | 1 | 2.89096E+03 | 3.98853E+02 | 4.04577E+02 | 4.86819E+00 |
| 24 | 24 | 27 | | 1 | 0 | 1 | 2.89096E+03 | 3.98853E+02 | 4.04577E+02 | 4.86819E+00 |
| 25 | 25 | 28 | | 1 | 0 | 1 | 2.91010E+03 | 3.98817E+02 | 4.04579E+02 | 4.86776E+00 |
| 26 | 26 | 29 | | 1 | 0 | 1 | 2.91011E+03 | 3.98816E+02 | 4.04577E+02 | 4.86774E+00 |
| 27 | 27 | 30 | | 1 | 0 | 1 | 2.91011E+03 | 3.98816E+02 | 4.04577E+02 | 4.86774E+00 |
| 28 | 28 | 31 | | 1 | 0 | 1 | 2.92976E+03 | 3.98779E+02 | 4.04579E+02 | 4.86729E+00 |
| 29 | 29 | 32 | | 1 | 0 | 1 | 2.92977E+03 | 3.98778E+02 | 4.04577E+02 | 4.86727E+00 |
| 30 | 30 | 33 | | 1 | 0 | 1 | 2.92977E+03 | 3.98778E+02 | 4.04577E+02 | 4.86727E+00 |

[redacted]

__find line length from elt. length

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 31 | 31 | 34 | | 1 | 0 | 1 | 2.94993E+03 | 3.98740E+02 | 4.04579E+02 | 4.86682E+00 |
| 32 | 32 | 35 | | 1 | 0 | 1 | 2.94994E+03 | 3.98739E+02 | 4.04577E+02 | 4.86680E+00 |
| 33 | 33 | 36 | | 1 | 0 | 1 | 2.94994E+03 | 3.98739E+02 | 4.04577E+02 | 4.86680E+00 |
| 34 | 34 | 37 | | 1 | 0 | 1 | 2.97059E+03 | 3.98700E+02 | 4.04579E+02 | 4.86633E+00 |
| 35 | 35 | 38 | | 1 | 0 | 1 | 2.97059E+03 | 3.98699E+02 | 4.04577E+02 | 4.86631E+00 |
| 36 | 36 | 39 | | 1 | 0 | 1 | 2.97059E+03 | 3.98699E+02 | 4.04577E+02 | 4.86631E+00 |
| 37 | 37 | 40 | | 1 | 0 | 1 | 2.99172E+03 | 3.98660E+02 | 4.04579E+02 | 4.86583E+00 |
| 38 | 38 | 41 | | 1 | 0 | 1 | 2.99173E+03 | 3.98658E+02 | 4.04577E+02 | 4.86581E+00 |
| 39 | 39 | 42 | | 1 | 0 | 1 | 2.99173E+03 | 3.98658E+02 | 4.04577E+02 | 4.86581E+00 |
| 40 | 40 | 43 | | 1 | 0 | 1 | 3.01333E+03 | 3.98618E+02 | 4.04579E+02 | 4.86532E+00 |
| 41 | 41 | 44 | | 1 | 0 | 1 | 3.01334E+03 | 3.98616E+02 | 4.04577E+02 | 4.86530E+00 |
| 42 | 42 | 45 | | 1 | 0 | 1 | 3.01334E+03 | 3.98616E+02 | 4.04577E+02 | 4.86530E+00 |
| 43 | 43 | 46 | | 1 | 0 | 1 | 3.03540E+03 | 3.98575E+02 | 4.04579E+02 | 4.86480E+00 |
| 44 | 44 | 47 | | 1 | 0 | 1 | 3.03541E+03 | 3.98574E+02 | 4.04578E+02 | 4.86478E+00 |
| 45 | 45 | 48 | | 1 | 0 | 1 | 3.03541E+03 | 3.98574E+02 | 4.04578E+02 | 4.86478E+00 |
| 46 | 46 | 49 | | 1 | 0 | 1 | 3.05793E+03 | 3.98532E+02 | 4.04579E+02 | 4.86427E+00 |
| 47 | 47 | 50 | | 1 | 0 | 1 | 3.05793E+03 | 3.98530E+02 | 4.04578E+02 | 4.86425E+00 |
| 48 | 48 | 51 | | 1 | 0 | 1 | 3.05793E+03 | 3.98530E+02 | 4.04578E+02 | 4.86425E+00 |
| 49 | 49 | 52 | | 1 | 0 | 1 | 3.08089E+03 | 3.98487E+02 | 4.04579E+02 | 4.86373E+00 |
| 50 | 50 | 53 | | 1 | 0 | 1 | 3.08090E+03 | 3.98486E+02 | 4.04578E+02 | 4.86371E+00 |
| 51 | 51 | 54 | | 1 | 0 | 1 | 3.08090E+03 | 3.98486E+02 | 4.04578E+02 | 4.86371E+00 |
| 52 | 52 | 55 | | 1 | 0 | 1 | 3.10428E+03 | 3.98442E+02 | 4.04579E+02 | 4.86318E+00 |

SEADYN--Test Case with 151 elements. hour 2.2 * /
#
/usr/l PAGE 16

ELEMENT SUMMARY DATA

| ELT NO. | CONNECTION N1 | N2 | DATA N3 | MAT NO. | COMP CODE | MED. CODE | INITIAL TENSION | UNSTRETCHED LENGTH | INITIAL LENGTH | RESIDUAL MASS |
|---|---|---|---|---|---|---|---|---|---|---|
| 53 | 53 | 56 | | 1 | 0 | 1 | 3.10429E+03 | 3.98441E+02 | 4.04578E+02 | 4.86316E+00 |
| 54 | 54 | 57 | | 1 | 0 | 1 | 3.10429E+03 | 3.98441E+02 | 4.04578E+02 | 4.86316E+00 |
| 55 | 55 | 58 | | 1 | 0 | 1 | 3.12810E+03 | 3.98396E+02 | 4.04580E+02 | 4.86262E+00 |
| 56 | 56 | 59 | | 1 | 0 | 1 | 3.12811E+03 | 3.98395E+02 | 4.04578E+02 | 4.86260E+00 |
| 57 | 57 | 60 | | 1 | 0 | 1 | 3.12811E+03 | 3.98395E+02 | 4.04578E+02 | 4.86260E+00 |
| 58 | 58 | 61 | | 1 | 0 | 1 | 3.15233E+03 | 3.98350E+02 | 4.04580E+02 | 4.86205E+00 |
| 59 | 59 | 62 | | 1 | 0 | 1 | 3.15234E+03 | 3.98348E+02 | 4.04578E+02 | 4.86203E+00 |
| 60 | 60 | 63 | | 1 | 0 | 1 | 3.15234E+03 | 3.98348E+02 | 4.04578E+02 | 4.86203E+00 |
| 61 | 61 | 64 | | 1 | 0 | 1 | 3.17696E+03 | 3.98302E+02 | 4.04580E+02 | 4.86147E+00 |
| 62 | 62 | 65 | | 1 | 0 | 1 | 3.17697E+03 | 3.98300E+02 | 4.04578E+02 | 4.86145E+00 |
| 63 | 63 | 66 | | 1 | 0 | 1 | 3.17697E+03 | 3.98300E+02 | 4.04578E+02 | 4.86145E+00 |
| 64 | 64 | 67 | | 1 | 0 | 1 | 3.20199E+03 | 3.98254E+02 | 4.04580E+02 | 4.86088E+00 |
| 65 | 65 | 68 | | 1 | 0 | 1 | 3.20200E+03 | 3.98252E+02 | 4.04578E+02 | 4.86086E+00 |
| 66 | 66 | 69 | | 1 | 0 | 1 | 3.20200E+03 | 3.98252E+02 | 4.04578E+02 | 4.86086E+00 |
| 67 | 67 | 70 | | 1 | 0 | 1 | 3.22740E+03 | 3.98205E+02 | 4.04580E+02 | 4.86028E+00 |
| 68 | 68 | 71 | | 1 | 0 | 1 | 3.22741E+03 | 3.98203E+02 | 4.04578E+02 | 4.86026E+00 |
| 69 | 69 | 72 | | 1 | 0 | 1 | 3.22741E+03 | 3.98203E+02 | 4.04578E+02 | 4.86026E+00 |
| 70 | 70 | 73 | | 1 | 0 | 1 | 3.25318E+03 | 3.98155E+02 | 4.04580E+02 | 4.85968E+00 |
| 71 | 71 | 74 | | 1 | 0 | 1 | 3.25319E+03 | 3.98154E+02 | 4.04578E+02 | 4.85966E+00 |
| 72 | 72 | 75 | | 1 | 0 | 1 | 3.25319E+03 | 3.98154E+02 | 4.04578E+02 | 4.85966E+00 |
| 73 | 73 | 76 | | 1 | 0 | 1 | 3.27934E+03 | 3.98105E+02 | 4.04580E+02 | 4.85906E+00 |
| 74 | 74 | 77 | | 1 | 0 | 1 | 3.27934E+03 | 3.98103E+02 | 4.04578E+02 | 4.85904E+00 |
| 75 | 75 | 78 | | 1 | 0 | 1 | 3.27934E+03 | 3.98103E+02 | 4.04578E+02 | 4.85904E+00 |
| 76 | 76 | 79 | | 1 | 0 | 1 | 3.30585E+03 | 3.98054E+02 | 4.04580E+02 | 4.85844E+00 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 77 | 77 | 80 | | 1 | 0 | 1 | 3.30586E+03 | 3.98052E+02 | 4.04578E+02 | 4.85842E+00 |
| 78 | 78 | 81 | | 1 | 0 | 1 | 3.30586E+03 | 3.98052E+02 | 4.04578E+02 | 4.85842E+00 |
| 79 | 79 | 82 | | 1 | 0 | 1 | 3.33271E+03 | 3.98002E+02 | 4.04580E+02 | 4.85781E+00 |
| 80 | 80 | 83 | | 1 | 0 | 1 | 3.33271E+03 | 3.98001E+02 | 4.04578E+02 | 4.85779E+00 |
| 81 | 81 | 84 | | 1 | 0 | 1 | 3.33271E+03 | 3.98001E+02 | 4.04578E+02 | 4.85779E+00 |
| 82 | 82 | 85 | | 1 | 0 | 1 | 3.35991E+03 | 3.97950E+02 | 4.04580E+02 | 4.85717E+00 |
| 83 | 83 | 86 | | 1 | 0 | 1 | 3.35992E+03 | 3.97948E+02 | 4.04578E+02 | 4.85715E+00 |
| 84 | 84 | 87 | | 1 | 0 | 1 | 3.35992E+03 | 3.97948E+02 | 4.04578E+02 | 4.85715E+00 |
| 85 | 85 | 88 | | 1 | 0 | 1 | 3.38744E+03 | 3.97897E+02 | 4.04580E+02 | 4.85652E+00 |
| 86 | 86 | 89 | | 1 | 0 | 1 | 3.38745E+03 | 3.97895E+02 | 4.04578E+02 | 4.85650E+00 |
| 87 | 87 | 90 | | 1 | 0 | 1 | 3.38745E+03 | 3.97895E+02 | 4.04578E+02 | 4.85650E+00 |
| 88 | 88 | 91 | | 1 | 0 | 1 | 3.41530E+03 | 3.97843E+02 | 4.04580E+02 | 4.85587E+00 |
| 89 | 89 | 92 | | 1 | 0 | 1 | 3.41531E+03 | 3.97842E+02 | 4.04578E+02 | 4.85585E+00 |
| 90 | 90 | 93 | | 1 | 0 | 1 | 3.41531E+03 | 3.97842E+02 | 4.04578E+02 | 4.85585E+00 |
| 91 | 91 | 94 | | 1 | 0 | 1 | 3.44347E+03 | 3.97789E+02 | 4.04580E+02 | 4.85521E+00 |
| 92 | 92 | 95 | | 1 | 0 | 1 | 3.44348E+03 | 3.97788E+02 | 4.04578E+02 | 4.85519E+00 |
| 93 | 93 | 96 | | 1 | 0 | 1 | 3.44348E+03 | 3.97788E+02 | 4.04578E+02 | 4.85519E+00 |
| 94 | 94 | 97 | | 1 | 0 | 1 | 3.47196E+03 | 3.97735E+02 | 4.04580E+02 | 4.85454E+00 |
| 95 | 95 | 98 | | 1 | 0 | 1 | 3.47197E+03 | 3.97733E+02 | 4.04579E+02 | 4.85452E+00 |
| 96 | 96 | 99 | | 1 | 0 | 1 | 3.47197E+03 | 3.97733E+02 | 4.04579E+02 | 4.85452E+00 |
| 97 | 97 | 100 | | 1 | 0 | 1 | 3.50074E+03 | 3.97679E+02 | 4.04580E+02 | 4.85387E+00 |
| 98 | 98 | 101 | | 1 | 0 | 1 | 3.50075E+03 | 3.97678E+02 | 4.04579E+02 | 4.85385E+00 |
| 99 | 99 | 102 | | 1 | 0 | 1 | 3.50075E+03 | 3.97678E+02 | 4.04579E+02 | 4.85385E+00 |
| 100 | 100 | 103 | | 1 | 0 | 1 | 3.52982E+03 | 3.97624E+02 | 4.04580E+02 | 4.85319E+00 |
| 101 | 101 | 104 | | 1 | 0 | 1 | 3.52983E+03 | 3.97622E+02 | 4.04579E+02 | 4.85316E+00 |
| 102 | 102 | 105 | | 1 | 0 | 1 | 3.52983E+03 | 3.97622E+02 | 4.04579E+02 | 4.85316E+00 |
| 103 | 103 | 106 | | 1 | 0 | 1 | 3.55919E+03 | 3.97567E+02 | 4.04580E+02 | 4.85250E+00 |
| 104 | 104 | 107 | | 1 | 0 | 1 | 3.55920E+03 | 3.97565E+02 | 4.04579E+02 | 4.85248E+00 |

SEADYN--Test Case with 151 elements. hour 2.2 * /

/usr/l PAGE 17

ELEMENT SUMMARY DATA

| ELT NO. | CONNECTION N1 | N2 | DATA N3 | MAT NO. | COMP CODE | MED. CODE | INITIAL TENSION | UNSTRETCHED LENGTH | INITIAL LENGTH | RESIDUAL MASS |
|---|---|---|---|---|---|---|---|---|---|---|
| 105 | 105 | 108 | | 1 | 0 | 1 | 3.55920E+03 | 3.97565E+02 | 4.04579E+02 | 4.85248E+00 |
| 106 | 106 | 109 | | 1 | 0 | 1 | 3.58884E+03 | 3.97510E+02 | 4.04580E+02 | 4.85180E+00 |
| 107 | 107 | 110 | | 1 | 0 | 1 | 3.58884E+03 | 3.97509E+02 | 4.04579E+02 | 4.85178E+00 |
| 108 | 108 | 111 | | 1 | 0 | 1 | 3.58884E+03 | 3.97509E+02 | 4.04579E+02 | 4.85178E+00 |
| 109 | 109 | 112 | | 1 | 0 | 1 | 3.61876E+03 | 3.97453E+02 | 4.04581E+02 | 4.85110E+00 |
| 110 | 110 | 113 | | 1 | 0 | 1 | 3.61876E+03 | 3.97451E+02 | 4.04579E+02 | 4.85108E+00 |
| 111 | 111 | 114 | | 1 | 0 | 1 | 3.61876E+03 | 3.97451E+02 | 4.04579E+02 | 4.85108E+00 |
| 112 | 112 | 115 | | 1 | 0 | 1 | 3.64894E+03 | 3.97395E+02 | 4.04581E+02 | 4.85040E+00 |
| 113 | 113 | 116 | | 1 | 0 | 1 | 3.64895E+03 | 3.97393E+02 | 4.04579E+02 | 4.85038E+00 |
| 114 | 114 | 117 | | 1 | 0 | 1 | 3.64895E+03 | 3.97393E+02 | 4.04579E+02 | 4.85038E+00 |
| 115 | 115 | 118 | | 1 | 0 | 1 | 3.67939E+03 | 3.97337E+02 | 4.04581E+02 | 4.84969E+00 |
| 116 | 116 | 119 | | 1 | 0 | 1 | 3.67940E+03 | 3.97335E+02 | 4.04579E+02 | 4.84967E+00 |
| 117 | 117 | 120 | | 1 | 0 | 1 | 3.67940E+03 | 3.97335E+02 | 4.04579E+02 | 4.84967E+00 |
| 118 | 118 | 121 | | 1 | 0 | 1 | 3.71009E+03 | 3.97278E+02 | 4.04581E+02 | 4.84897E+00 |
| 119 | 119 | 122 | | 1 | 0 | 1 | 3.71010E+03 | 3.97276E+02 | 4.04579E+02 | 4.84895E+00 |
| 120 | 120 | 123 | | 1 | 0 | 1 | 3.71010E+03 | 3.97276E+02 | 4.04579E+02 | 4.84895E+00 |
| 121 | 121 | 124 | | 1 | 0 | 1 | 3.74104E+03 | 3.97219E+02 | 4.04581E+02 | 4.84825E+00 |
| 122 | 122 | 125 | | 1 | 0 | 1 | 3.74104E+03 | 3.97217E+02 | 4.04579E+02 | 4.84823E+00 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 123 | 123 | 126 | 1 | 0 | 1 | 3.74104E+03 | 3.97217E+02 | 4.04579E+02 | 4.84823E+00 |
| 124 | 124 | 127 | 1 | 0 | 1 | 3.77222E+03 | 3.97159E+02 | 4.04581E+02 | 4.84752E+00 |
| 125 | 125 | 128 | 1 | 0 | 1 | 3.77223E+03 | 3.97157E+02 | 4.04579E+02 | 4.84750E+00 |
| 126 | 126 | 129 | 1 | 0 | 1 | 3.77223E+03 | 3.97157E+02 | 4.04579E+02 | 4.84750E+00 |
| 127 | 127 | 130 | 1 | 0 | 1 | 3.80365E+03 | 3.97099E+02 | 4.04581E+02 | 4.84678E+00 |
| 128 | 128 | 131 | 1 | 0 | 1 | 3.80365E+03 | 3.97097E+02 | 4.04579E+02 | 4.84676E+00 |
| 129 | 129 | 132 | 1 | 0 | 1 | 3.80365E+03 | 3.97097E+02 | 4.04579E+02 | 4.84676E+00 |
| 130 | 130 | 133 | 1 | 0 | 1 | 3.83530E+03 | 3.97039E+02 | 4.04581E+02 | 4.84605E+00 |
| 131 | 131 | 134 | 1 | 0 | 1 | 3.83531E;03 | 3.97037E+02 | 4.04579E+02 | 4.84603E+00 |
| 132 | 132 | 135 | 1 | 0 | 1 | 3.83531E+03 | 3.97037E+02 | 4.04579E+02 | 4.84603E+00 |
| 133 | 133 | 136 | 1 | 0 | 1 | 3.86718E+03 | 3.96978E+02 | 4.04581E+02 | 4.84530E+00 |
| 134 | 134 | 137 | 1 | 0 | 1 | 3.86718E+03 | 3.96976E+02 | 4.04579E+02 | 4.84528E+00 |
| 135 | 135 | 138 | 1 | 0 | 1 | 3.86718E+03 | 3.96976E+02 | 4.04579E+02 | 4.84528E+00 |
| 136 | 136 | 139 | 1 | 0 | 1 | 3.89927E+03 | 3.96916E+02 | 4.04581E+02 | 4.84456E+00 |
| 137 | 137 | 140 | 1 | 0 | 1 | 3.89928E+03 | 3.96915E+02 | 4.04579E+02 | 4.84453E+00 |
| 138 | 138 | 141 | 1 | 0 | 1 | 3.89928E+03 | 3.96915E+02 | 4.04579E+02 | 4.84453E+00 |
| 139 | 139 | 142 | 1 | 0 | 1 | 3.93158E+03 | 3.96855E+02 | 4.04581E+02 | 4.84380E+00 |
| 140 | 140 | 143 | 1 | 0 | 1 | 3.93158E+03 | 3.96853E+02 | 4.04579E+02 | 4.84378E+00 |
| 141 | 141 | 144 | 1 | 0 | 1 | 3.93158E+03 | 3.96853E+02 | 4.04579E+02 | 4.84378E+00 |
| 142 | 142 | 145 | 1 | 0 | 1 | 3.96409E+03 | 3.96793E+02 | 4.04581E+02 | 4.84305E+00 |
| 143 | 143 | 146 | 1 | 0 | 1 | 3.96410E+03 | 3.96791E+02 | 4.04579E+02 | 4.84302E+00 |
| 144 | 144 | 147 | 1 | 0 | 1 | 3.96410E+03 | 3.96791E+02 | 4.04579E+02 | 4.84302E+00 |
| 145 | 145 | 148 | 1 | 0 | 1 | 3.99681E+03 | 3.96730E+02 | 4.04581E+02 | 4.84228E+00 |
| 146 | 146 | 149 | 1 | 0 | 1 | 3.99681E+03 | 3.96729E+02 | 4.04579E+02 | 4.84226E+00 |
| 147 | 147 | 150 | 1 | 0 | 1 | 3.99681E+03 | 3.96729E+02 | 4.04579E+02 | 4.84226E+00 |
| 148 | 148 | 151 | 1 | 0 | 1 | 3.99553E+03 | 3.99188E+02 | 4.07084E+02 | 4.87228E+00 |
| 149 | 149 | 151 | 1 | 0 | 1 | 3.99770E+03 | 3.99023E+02 | 4.06920E+02 | 4.87026E+00 |
| 150 | 150 | 151 | 1 | 0 | 1 | 3.99770E+03 | 3.99023E+02 | 4.06920E+02 | 4.87026E+00 |
| 151 | 152 | 151 | 2 | 0 | 1 | 1.00000E+00 | 3.00000E+02 | 3.00000E+02 | 9.37381E+04 |

SEADYN--Test Case with 151 elements. hour 2.2 * /

/usr/l PAGE 18

ADDITIONAL ELEMENT DATA

| ELEMENT | | SLOPES | | TRANSIT TIME(APPROX) |
|---|---|---|---|---|
| 1 | 9.37921E-01 | 0.00000E+00 | 3.46850E-01 | 1.48603E-01 |
| 2 | -4.68970E-01 | -8.12256E-01 | 3.46855E-01 | 1.48602E-01 |
| 3 | -4.68970E-01 | 8.12256E-01 | 3.46855E-01 | 1.48602E-01 |
| 4 | 9.32779E-01 | 0.00000E+00 | 3.60450E-01 | 1.48592E-01 |
| 5 | -4.66399E-01 | -8.07802E-01 | 3.60455E-01 | 1.48591E-01 |
| 6 | -4.66399E-01 | 8.07802E-01 | 3.60455E-01 | 1.48591E-01 |
| 7 | 9.27500E-01 | 0.00000E+00 | 3.73824E-01 | 1.48581E-01 |
| 8 | -4.63759E-01 | -8.03231E-01 | 3.73829E-01 | 1.48580E-01 |
| 9 | -4.63759E-01 | 8.03231E-01 | 3.73829E-01 | 1.48580E-01 |
| 10 | 9.22093E-01 | 0.00000E+00 | 3.86969E-01 | 1.48569E-01 |
| 11 | -4.61056E-01 | -7.98548E-01 | 3.86973E-01 | 1.48568E-01 |
| 12 | -4.61056E-01 | 7.98548E-01 | 3.86973E-01 | 1.48568E-01 |
| 13 | 9.16567E-01 | 0.00000E+00 | 3.99882E-01 | 1.48557E-01 |
| 14 | -4.58292E-01 | -7.93763E-01 | 3.99886E-01 | 1.48556E-01 |
| 15 | -4.58292E-01 | 7.93763E-01 | 3.99886E-01 | 1.48556E-01 |
| 16 | 9.10930E-01 | 0.00000E+00 | 4.12561E-01 | 1.48544E-01 |
| 17 | -4.55474E-01 | -7.88881E-01 | 4.12565E-01 | 1.48543E-01 |
| 18 | -4.55474E-01 | 7.88881E-01 | 4.12565E-01 | 1.48543E-01 |

[redacted]

__3rd column invers
sine horiz. rule

| | | | | |
|---|---|---|---|---|
| 19 | 9.05191E-01 | 0.00000E+00 | 4.25005E-01 | 1.48531E-01 |
| 20 | -4.52604E-01 | -7.83911E-01 | 4.25009E-01 | 1.48530E-01 |
| 21 | -4.52604E-01 | 7.83911E-01 | 4.25009E-01 | 1.48530E-01 |
| 22 | 8.99358E-01 | 0.00000E+00 | 4.37212E-01 | 1.48517E-01 |
| 23 | -4.49688E-01 | -7.78860E-01 | 4.37217E-01 | 1.48517E-01 |
| 24 | -4.49688E-01 | 7.78860E-01 | 4.37217E-01 | 1.48517E-01 |
| 25 | 8.93440E-01 | 0.00000E+00 | 4.49183E-01 | 1.48504E-01 |
| 26 | -4.46729E-01 | -7.73734E-01 | 4.49187E-01 | 1.48503E-01 |
| 27 | -4.46729E-01 | 7.73734E-01 | 4.49187E-01 | 1.48503E-01 |
| 28 | 8.87443E-01 | 0.00000E+00 | 4.60917E-01 | 1.48490E-01 |
| 29 | -4.43730E-01 | -7.68541E-01 | 4.60921E-01 | 1.48489E-01 |
| 30 | -4.43730E-01 | 7.68541E-01 | 4.60921E-01 | 1.48489E-01 |
| 31 | 8.81377E-01 | 0.00000E+00 | 4.72413E-01 | 1.48475E-01 |
| 32 | -4.40697E-01 | -7.63288E-01 | 4.72417E-01 | 1.48474E-01 |
| 33 | -4.40697E-01 | 7.63288E-01 | 4.72417E-01 | 1.48474E-01 |
| 34 | 8.75248E-01 | 0.00000E+00 | 4.83674E-01 | 1.48460E-01 |
| 35 | -4.37633E-01 | -7.57980E-01 | 4.83678E-01 | 1.48460E-01 |
| 36 | -4.37633E-01 | 7.57980E-01 | 4.83678E-01 | 1.48460E-01 |
| 37 | 8.69064E-01 | 0.00000E+00 | 4.94699E-01 | 1.48445E-01 |
| 38 | -4.34541E-01 | -7.52624E-01 | 4.94703E-01 | 1.48444E-01 |
| 39 | -4.34541E-01 | 7.52624E-01 | 4.94703E-01 | 1.48444E-01 |
| 40 | 8.62832E-01 | 0.00000E+00 | 5.05491E-01 | 1.48429E-01 |
| 41 | -4.31424E-01 | -7.47227E-01 | 5.05495E-01 | 1.48429E-01 |
| 42 | -4.31424E-01 | 7.47227E-01 | 5.05495E-01 | 1.48429E-01 |
| 43 | 8.56558E-01 | 0.00000E+00 | 5.16051E-01 | 1.48414E-01 |
| 44 | -4.28287E-01 | -7.41794E-01 | 5.16054E-01 | 1.48413E-01 |
| 45 | -4.28287E-01 | 7.41794E-01 | 5.16054E-01 | 1.48413E-01 |
| 46 | 8.50249E-01 | 0.00000E+00 | 5.26380E-01 | 1.48397E-01 |
| 47 | -4.25133E-01 | -7.36330E-01 | 5.26383E-01 | 1.48397E-01 |
| 48 | -4.25133E-01 | 7.36330E-01 | 5.26383E-01 | 1.48397E-01 |
| 49 | 8.43912E-01 | 0.00000E+00 | 5.36481E-01 | 1.48381E-01 |
| 50 | -4.21964E-01 | -7.30842E-01 | 5.36485E-01 | 1.48380E-01 |
| 51 | -4.21964E-01 | 7.30842E-01 | 5.36485E-01 | 1.48380E-01 |
| 52 | 8.37552E-01 | 0.00000E+00 | 5.46357E-01 | 1.48364E-01 |
| 53 | -4.18784E-01 | -7.25334E-01 | 5.46361E-01 | 1.48363E-01 |
| 54 | -4.18784E-01 | 7.25334E-01 | 5.46361E-01 | 1.48363E-01 |
| 55 | 8.31175E-01 | 0.00000E+00 | 5.56011E-01 | 1.48347E-01 |
| 56 | -4.15596E-01 | -7.19812E-01 | 5.56014E-01 | 1.48346E-01 |
| 57 | -4.15596E-01 | 7.19812E-01 | 5.56014E-01 | 1.48346E-01 |
| 58 | 8.24787E-01 | 0.00000E+00 | 5.65444E-01 | 1.48330E-01 |
| 59 | -4.12401E-01 | -7.14279E-01 | 5.65447E-01 | 1.48329E-01 |
| 60 | -4.12401E-01 | 7.14279E-01 | 5.65447E-01 | 1.48329E-01 |
| 61 | 8.18392E-01 | 0.00000E+00 | 5.74661E-01 | 1.48312E-01 |
| 62 | -4.09204E-01 | -7.08741E-01 | 5.74664E-01 | 1.48311E-01 |
| 63 | -4.09204E-01 | 7.08741E-01 | 5.74664E-01 | 1.48311E-01 |
| 64 | 8.11995E-01 | 0.00000E+00 | 5.83664E-01 | 1.48294E-01 |
| 65 | -4.06006E-01 | -7.03202E-01 | 5.83667E-01 | 1.48293E-01 |
| 66 | -4.06006E-01 | 7.03202E-01 | 5.83667E-01 | 1.48293E-01 |
| 67 | 8.05602E-01 | 0.00000E+00 | 5.92457E-01 | 1.48276E-01 |
| 68 | -4.02809E-01 | -6.97665E-01 | 5.92459E-01 | 1.48275E-01 |
| 69 | -4.02809E-01 | 6.97665E-01 | 5.92459E-01 | 1.48275E-01 |
| 70 | 7.99217E-01 | 0.00000E+00 | 6.01043E-01 | 1.48257E-01 |
| 71 | -3.99616E-01 | -6.92135E-01 | 6.01045E-01 | 1.48257E-01 |
| 72 | -3.99616E-01 | 6.92135E-01 | 6.01045E-01 | 1.48257E-01 |
| 73 | 7.92843E-01 | 0.00000E+00 | 6.09426E-01 | 1.48238E-01 |
| 74 | -3.96429E-01 | -6.86616E-01 | 6.09428E-01 | 1.48238E-01 |

| | | | | |
|---|---|---|---|---|
| 75 | -3.96429E-01 | 6.86616E-01 | 6.09428E-01 | 1.48238E-01 |
| 76 | 7.86485E-01 | 0.00000E+00 | 6.17609E-01 | 1.48219E-01 |
| 77 | -3.93250E-01 | -6.81110E-01 | 6.17611E-01 | 1.48219E-01 |
| 78 | -3.93250E-01 | 6.81110E-01 | 6.17611E-01 | 1.48219E-01 |
| 79 | 7.80147E-01 | 0.00000E+00 | 6.25597E-01 | 1.48200E-01 |
| 80 | -3.90081E-01 | -6.75620E-01 | 6.25599E-01 | 1.48200E-01 |
| 81 | -3.90081E-01 | 6.75620E-01 | 6.25599E-01 | 1.48200E-01 |
| 82 | 7.73831E-01 | 0.00000E+00 | 6.33392E-01 | 1.48181E-01 |
| 83 | -3.86923E-01 | -6.70151E-01 | 6.33395E-01 | 1.48180E-01 |
| 84 | -3.86923E-01 | 6.70151E-01 | 6.33395E-01 | 1.48180E-01 |
| 85 | 7.67541E-01 | 0.00000E+00 | 6.41000E-01 | 1.48161E-01 |
| 86 | -3.83778E-01 | -6.64704E-01 | 6.41002E-01 | 1.48160E-01 |
| 87 | -3.83778E-01 | 6.64704E-01 | 6.41002E-01 | 1.48160E-01 |
| 88 | 7.61280E-01 | 0.00000E+00 | 6.48423E-01 | 1.48141E-01 |
| 89 | -3.80648E-01 | -6.59282E-01 | 6.48425E-01 | 1.48140E-01 |
| 90 | -3.80648E-01 | 6.59282E-01 | 6.48425E-01 | 1.48140E-01 |
| 91 | 7.55051E-01 | 0.00000E+00 | 6.55666E-01 | 1.48121E-01 |
| 92 | -3.77533E-01 | -6.53887E-01 | 6.55668E-01 | 1.48120E-01 |
| 93 | -3.77533E-01 | 6.53887E-01 | 6.55668E-01 | 1.48120E-01 |
| 94 | 7.48857E-01 | 0.00000E+00 | 6.62732E-01 | 1.48101E-01 |
| 95 | -3.74436E-01 | -6.48523E-01 | 6.62734E-01 | 1.48100E-01 |
| 96 | -3.74436E-01 | 6.48523E-01 | 6.62734E-01 | 1.48100E-01 |
| 97 | 7.42699E-01 | 0.00000E+00 | 6.69625E-01 | 1.48080E-01 |
| 98 | -3.71357E-01 | -6.43190E-01 | 6.69627E-01 | 1.48079E-01 |
| 99 | -3.71357E-01 | 6.43190E-01 | 6.69627E-01 | 1.48079E-01 |
| 100 | 7.36581E-01 | 0.00000E+00 | 6.76350E-01 | 1.48059E-01 |
| 101 | -3.68298E-01 | -6.37892E-01 | 6.76351E-01 | 1.48058E-01 |
| 102 | -3.68298E-01 | 6.37892E-01 | 6.76351E-01 | 1.48058E-01 |
| 103 | 7.30503E-01 | 0.00000E+00 | 6.82909E-01 | 1.48038E-01 |
| 104 | -3.65259E-01 | -6.32628E-01 | 6.82911E-01 | 1.48038E-01 |
| 105 | -3.65259E-01 | 6.32628E-01 | 6.82911E-01 | 1.48038E-01 |
| 106 | 7.24468E-01 | 0.00000E+00 | 6.89308E-01 | 1.48017E-01 |
| 107 | -3.62242E-01 | -6.27402E-01 | 6.89309E-01 | 1.48016E-01 |
| 108 | -3.62242E-01 | 6.27402E-01 | 6.89309E-01 | 1.48016E-01 |
| 109 | 7.18479E-01 | 0.00000E+00 | 6.95549E-01 | 1.47996E-01 |
| 110 | -3.59246E-01 | -6.22215E-01 | 6.95551E-01 | 1.47995E-01 |
| 111 | -3.59246E-01 | 6.22215E-01 | 6.95551E-01 | 1.47995E-01 |
| 112 | 7.12535E-01 | 0.00000E+00 | 7.01637E-01 | 1.47974E-01 |
| 113 | -3.56275E-01 | -6.17068E-01 | 7.01638E-01 | 1.47973E-01 |
| 114 | -3.56275E-01 | 6.17068E-01 | 7.01638E-01 | 1.47973E-01 |
| 115 | 7.06639E-01 | 0.00000E+00 | 7.07574E-01 | 1.47952E-01 |
| 116 | -3.53327E-01 | -6.11962E-01 | 7.07576E-01 | 1.47952E-01 |
| 117 | -3.53327E-01 | 6.11962E-01 | 7.07576E-01 | 1.47952E-01 |
| 118 | 7.00792E-01 | 0.00000E+00 | 7.13366E-01 | 1.47930E-01 |
| 119 | -3.50403E-01 | -6.06898E-01 | 7.13367E-01 | 1.47930E-01 |
| 120 | -3.50403E-01 | 6.06898E-01 | 7.13367E-01 | 1.47930E-01 |
| 121 | 6.94995E-01 | 0.00000E+00 | 7.19015E-01 | 1.47908E-01 |
| 122 | -3.47504E-01 | -6.01877E-01 | 7.19016E-01 | 1.47908E-01 |
| 123 | -3.47504E-01 | 6.01877E-01 | 7.19016E-01 | 1.47908E-01 |
| 124 | 6.89249E-01 | 0.00000E+00 | 7.24525E-01 | 1.47886E-01 |
| 125 | -3.44631E-01 | -5.96901E-01 | 7.24526E-01 | 1.47886E-01 |
| 126 | -3.44631E-01 | 5.96901E-01 | 7.24526E-01 | 1.47886E-01 |
| 127 | 6.83555E-01 | 0.00000E+00 | 7.29899E-01 | 1.47864E-01 |
| 128 | -3.41784E-01 | -5.91970E-01 | 7.29901E-01 | 1.47863E-01 |
| 129 | -3.41784E-01 | 5.91970E-01 | 7.29901E-01 | 1.47863E-01 |
| 130 | 6.77913E-01 | 0.00000E+00 | 7.35142E-01 | 1.47841E-01 |

| | | | | |
|---|---|---|---|---|
| 131 | -3.38964E-01 | -5.87085E-01 | 7.35143E-01 | 1.47841E-01 |
| 132 | -3.38964E-01 | 5.87085E-01 | 7.35143E-01 | 1.47841E-01 |
| 133 | 6.72325E-01 | 0.00000E+00 | 7.40256E-01 | 1.47819E-01 |
| 134 | -3.36170E-01 | -5.82246E-01 | 7.40257E-01 | 1.47818E-01 |
| 135 | -3.36170E-01 | 5.82246E-01 | 7.40257E-01 | 1.47818E-01 |
| 136 | 6.66792E-01 | 0.00000E+00 | 7.45244E-01 | 1.47796E-01 |
| 137 | -3.33403E-01 | -5.77453E-01 | 7.45245E-01 | 1.47795E-01 |
| 138 | -3.33403E-01 | 5.77453E-01 | 7.45245E-01 | 1.47795E-01 |
| 139 | 6.61312E-01 | 0.00000E+00 | 7.50111E-01 | 1.47773E-01 |
| 140 | -3.30663E-01 | -5.72708E-01 | 7.50112E-01 | 1.47772E-01 |
| 141 | -3.30663E-01 | 5.72708E-01 | 7.50112E-01 | 1.47772E-01 |
| 142 | 6.55888E-01 | 0.00000E+00 | 7.54858E-01 | 1.47750E-01 |
| 143 | -3.27951E-01 | -5.68011E-01 | 7.54859E-01 | 1.47749E-01 |
| 144 | -3.27951E-01 | 5.68011E-01 | 7.54859E-01 | 1.47749E-01 |
| 145 | 6.50519E-01 | 0.00000E+00 | 7.59490E-01 | 1.47727E-01 |
| 146 | -3.25266E-01 | -5.63361E-01 | 7.59491E-01 | 1.47726E-01 |
| 147 | -3.25266E-01 | 5.63361E-01 | 7.59491E-01 | 1.47726E-01 |
| 148 | 6.50728E-01 | 0.00000E+00 | 7.59311E-01 | 1.48642E-01 |
| 149 | -3.25194E-01 | -5.63236E-01 | 7.59614E-01 | 1.48580E-01 |
| 150 | -3.25194E-01 | 5.63236E-01 | 7.59614E-01 | 1.48580E-01 |
| 151 | 0.00000E+00 | 0.00000E+00 | 1.00000E+00 | 2.37244E+00 |

**KEY TO STANDARD OUTPUT FIXITY CODES FOR NODAL DISPLACEMENTS**

| CODE | EXPLANTION |
|---|---|
| 1 | FIXED, BUT MAY BE SUBJECT TO SPECIFIED LIMIT SET |
| 2 | FIXED WHILE RESERVED FOR PAYOUT |
| 3 | UNCONDITIONALLY FIXED |
| M | DYNAMICALLY MOVED |
| H | HELD WITH AN IMPOSED DISPLACEMENT |
| S | SLAVE COMPONENT |
| B | BUOY HELD AT SURFACE LIMIT |
| | FREE (UNCONSTRAINED) COMPONENT |

**HALF-BANDWIDTH = 12**

**SEADYN--Test Case with 151 elements.** hour 2.2 * /

/usr/l PAGE 19

L O A D C A S E P A R A M E T E R S

*SUBANALYSIS TYPE - DEAD*

**FIXED NODE COMPONENTS WITH CODE 3**
1511 1512 1513

[redacted]
__no current

**SEADYN--Test Case with 151 elements.** hour 2.2 * /

/usr/l PAGE 20

Aug 14 09:37 1991 seadyn.out Page 20

S O L U T I O N   O P T I O N   S U M M A R Y

ANALYSIS TYPE = DEAD
SOLUTION FORM = VRR

NO. OF STATIC STEPS = 1
OUTPUT INTERVAL = 0
OPTIONAL OUTPUT CODE = 0
RESTART FILE FLAG = 0
START UP OPTION = 0
NO. OF POINT LOADS = 0
FLOW FIELD NUMBER = 0
VISCOUS RELAXATION SOLUTION PARAMETERS
INTEGRATION PARAMETER = 0.10000E+01
INITIAL STEP SIZE = 0.10000E+01
INITIAL DAMPING = 0.10000E-02
ITERATION LIMIT = 150

SEADYN--Test Case with 151 elements.  hour 2.2 * /
$
/usr/1 PAGE 21

DEAD LOAD INCREMENT = 1 LOAD FACTOR 0.10000E+01

| NODE | FIXITY | | | X | Y | Z | VX | VY | VZ | ELT | TENSION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 3 | 3 | -1.600000E+04 | 0.000000E+00 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 1 | 2.751726E+03 |
| 2 | 3 | 3 | 3 | 8.000000E+03 | 1.385600E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 2 | 2.751560E+03 |
| 3 | 3 | 3 | 3 | 8.000000E+03 | -1.385600E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 3 | 2.751560E+03 |
| 4 | | | | -1.562085E+04 | 0.000000E+00 | -1.185895E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 4 | 2.766841E+03 |
| 5 | | | | 7.810420E+03 | 1.352765E+04 | -1.185895E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 5 | 2.766676E+03 |
| 6 | | | | 7.810420E+03 | -1.352765E+04 | -1.185895E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 6 | 2.766676E+03 |
| 7 | | | | -1.524377E+04 | 0.000000E+00 | -1.171245E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 7 | 2.782528E+03 |
| 8 | | | | 7.621879E+03 | 1.320109E+04 | -1.171245E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 8 | 2.782363E+03 |
| 9 | | | | 7.621879E+03 | -1.320109E+04 | -1.171245E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 9 | 2.782363E+03 |
| 10 | | | | -1.486883E+04 | 0.000000E+00 | -1.156057E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 10 | 2.798776E+03 |
| 11 | | | | 7.434403E+03 | 1.287639E+04 | -1.156057E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 11 | 2.798612E+03 |
| 12 | | | | 7.434403E+03 | -1.287639E+04 | -1.156057E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 12 | 2.798612E+03 |
| 13 | | | | -1.449606E+04 | 0.000000E+00 | -1.140341E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 13 | 2.815577E+03 |
| 14 | | | | 7.248019E+03 | 1.255357E+04 | -1.140342E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 14 | 2.815413E+03 |
| 15 | | | | 7.248019E+03 | -1.255357E+04 | -1.140342E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 15 | 2.815413E+03 |
| 16 | | | | -1.412553E+04 | 0.000000E+00 | -1.124108E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 16 | 2.832919E+03 |
| 17 | | | | 7.062748E+03 | 1.223268E+04 | -1.124108E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 17 | 2.832755E+03 |
| 18 | | | | 7.062748E+03 | -1.223268E+04 | -1.124108E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 18 | 2.832755E+03 |
| 19 | | | | -1.375726E+04 | 0.000000E+00 | -1.107365E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 19 | 2.850793E+03 |
| 20 | | | | 6.878614E+03 | 1.191376E+04 | -1.107365E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 20 | 2.850630E+03 |
| 21 | | | | 6.878614E+03 | -1.191376E+04 | -1.107365E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 21 | 2.850630E+03 |
| 22 | | | | -1.339131E+04 | 0.000000E+00 | -1.090122E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 22 | 2.869189E+03 |
| 23 | | | | 6.695636E+03 | 1.159684E+04 | -1.090122E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 23 | 2.869026E+03 |
| 24 | | | | 6.695636E+03 | -1.159684E+04 | -1.090122E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 24 | 2.869026E+03 |
| 25 | | | | -1.302771E+04 | 0.000000E+00 | -1.072390E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 25 | 2.888097E+03 |
| 26 | | | | 6.513833E+03 | 1.128196E+04 | -1.072390E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 26 | 2.887934E+03 |
| 27 | | | | 6.513833E+03 | -1.128196E+04 | -1.072390E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 27 | 2.887934E+03 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 28 | -1.266650E+04 | 0.000000E+00 | -1.054177E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 28 | 2.907506E+03 |
| 29 | 6.333222E+03 | 1.096914E+04 | -1.054177E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 29 | 2.907343E+03 |
| 30 | 6.333222E+03 | -1.096914E+04 | -1.054177E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 30 | 2.907343E+03 |
| 31 | -1.230769E+04 | 0.000000E+00 | -1.035493E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 31 | 2.927406E+03 |
| 32 | 6.153818E+03 | 1.065841E+04 | -1.035493E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 32 | 2.927244E+03 |
| 33 | 6.153818E+03 | -1.065841E+04 | -1.035493E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 33 | 2.927244E+03 |
| 34 | -1.195133E+04 | 0.000000E+00 | -1.016348E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 34 | 2.947787E+03 |
| 35 | 5.975635E+03 | 1.034980E+04 | -1.016347E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 35 | 2.947625E+03 |
| 36 | 5.975635E+03 | -1.034980E+04 | -1.016347E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 36 | 2.947625E+03 |
| 37 | -1.159744E+04 | 0.000000E+00 | -9.967501E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 37 | 2.968639E+03 |
| 38 | 5.798685E+03 | 1.004332E+04 | -9.967494E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 38 | 2.968477E+03 |
| 39 | 5.798685E+03 | -1.004332E+04 | -9.967494E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 39 | 2.968477E+03 |
| 40 | -1.124603E+04 | 0.000000E+00 | -9.767101E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 40 | 2.989951E+03 |
| 41 | 5.622979E+03 | 9.739000E+03 | -9.767092E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 41 | 2.989790E+03 |
| 42 | 5.622979E+03 | -9.739000E+03 | -9.767092E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 42 | 2.989790E+03 |
| 43 | -1.089713E+04 | 0.000000E+00 | -9.562369E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 43 | 3.011715E+03 |
| 44 | 5.448527E+03 | 9.436848E+03 | -9.562358E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 44 | 3.011554E+03 |
| 45 | 5.448527E+03 | -9.436848E+03 | -9.562358E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 45 | 3.011554E+03 |
| 46 | -1.055075E+04 | 0.000000E+00 | -9.353398E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 46 | 3.033919E+03 |
| 47 | 5.275335E+03 | 9.136881E+03 | -9.353385E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 47 | 3.033759E+03 |
| 48 | 5.275335E+03 | -9.136881E+03 | -9.353385E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 48 | 3.033759E+03 |
| 49 | -1.020691E+04 | 0.000000E+00 | -9.140281E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 49 | 3.056555E+03 |
| 50 | 5.103413E+03 | 8.839111E+03 | -9.140265E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 50 | 3.056394E+03 |
| 51 | 5.103413E+03 | -8.839111E+03 | -9.140265E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 51 | 3.056394E+03 |
| 52 | -9.865612E+03 | 0.000000E+00 | -8.923109E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 52 | 3.079611E+03 |
| 53 | 4.932763E+03 | 8.543546E+03 | -8.923091E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 53 | 3.079451E+03 |
| 54 | 4.932763E+03 | -8.543546E+03 | -8.923091E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 54 | 3.079451E+03 |
| 55 | -9.526873E+03 | 0.000000E+00 | -8.701972E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 55 | 3.103079E+03 |
| 56 | 4.763392E+03 | 8.250196E+03 | -8.701951E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 56 | 3.102919E+03 |
| 57 | 4.763392E+03 | -8.250196E+03 | -8.701951E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 57 | 3.102919E+03 |
| 58 | -9.190697E+03 | 0.000000E+00 | -8.476960E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 58 | 3.126949E+03 |
| 59 | 4.595303E+03 | 7.959064E+03 | -8.476937E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 59 | 3.126789E+03 |
| 60 | 4.595303E+03 | -7.959064E+03 | -8.476937E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 60 | 3.126789E+03 |
| 61 | -8.857087E+03 | 0.000000E+00 | -8.248161E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 61 | 3.151212E+03 |
| 62 | 4.428497E+03 | 7.670156E+03 | -8.248135E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 62 | 3.151052E+03 |
| 63 | 4.428497E+03 | -7.670156E+03 | -8.248135E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 63 | 3.151052E+03 |
| 64 | -8.526047E+03 | 0.000000E+00 | -8.015661E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 64 | 3.175858E+03 |
| 65 | 4.262975E+03 | 7.383473E+03 | -8.015632E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 65 | 3.175699E+03 |
| 66 | 4.262975E+03 | -7.383473E+03 | -8.015632E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 66 | 3.175699E+03 |
| 67 | -8.197575E+03 | 0.000000E+00 | -7.779547E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 67 | 3.200878E+03 |
| 68 | 4.098738E+03 | 7.099014E+03 | -7.779515E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 68 | 3.200719E+03 |
| 69 | 4.098738E+03 | -7.099014E+03 | -7.779515E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 69 | 3.200719E+03 |
| 70 | -7.871672E+03 | 0.000000E+00 | -7.539903E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 70 | 3.226264E+03 |
| 71 | 3.935785E+03 | 6.816780E+03 | -7.539867E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 71 | 3.226105E+03 |
| 72 | 3.935785E+03 | -6.816780E+03 | -7.539867E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 72 | 3.226105E+03 |
| 73 | -7.548332E+03 | 0.000000E+00 | -7.296811E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 73 | 3.252006E+03 |
| 74 | 3.774114E+03 | 6.536766E+03 | -7.296772E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 74 | 3.251847E+03 |
| 75 | 3.774114E+03 | -6.536766E+03 | -7.296772E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 75 | 3.251847E+03 |
| 76 | -7.227552E+03 | 0.000000E+00 | -7.050352E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 76 | 3.278096E+03 |
| 77 | 3.613723E+03 | 6.258969E+03 | -7.050310E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 77 | 3.277937E+03 |
| 78 | 3.613723E+03 | -6.258969E+03 | -7.050310E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 78 | 3.277937E+03 |
| 79 | -6.909325E+03 | 0.000000E+00 | -6.800608E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 79 | 3.304525E+03 |
| 80 | 3.454609E+03 | 5.983382E+03 | -6.800563E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 80 | 3.304366E+03 |
| 81 | 3.454609E+03 | -5.983382E+03 | -6.800563E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 81 | 3.304366E+03 |
| 82 | -6.593642E+03 | 0.000000E+00 | -6.547655E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 82 | 3.331285E+03 |
| 83 | 3.296767E+03 | 5.710000E+03 | -6.547607E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 83 | 3.331127E+03 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 84 | 3.296767E+03 | -5.710000E+03 | -6.547607E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 84 | 3.331127E+03 |
| 85 | -6.280495E+03 | 0.000000E+00 | -6.291572E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 85 | 3.358368E+03 |
| 86 | 3.140192E+03 | 5.438813E+03 | -6.291520E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 86 | 3.358210E+03 |
| 87 | 3.140192E+03 | -5.438813E+03 | -6.291520E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 87 | 3.358210E+03 |
| 88 | -5.969873E+03 | 0.000000E+00 | -6.032434E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 88 | 3.385765E+03 |
| 89 | 2.984880E+03 | 5.169813E+03 | -6.032378E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 89 | 3.385607E+03 |
| 90 | 2.984880E+03 | -5.169813E+03 | -6.032378E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 90 | 3.385607E+03 |
| 91 | -5.661763E+03 | 0.000000E+00 | -5.770313E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 91 | 3.413470E+03 |
| 92 | 2.830825E+03 | 4.902989E+03 | -5.770255E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 92 | 3.413312E+03 |
| 93 | 2.830825E+03 | -4.902989E+03 | -5.770255E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 93 | 3.413312E+03 |
| 94 | -5.356154E+03 | 0.000000E+00 | -5.505284E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 94 | 3.441473E+03 |
| 95 | 2.678020E+03 | 4.638331E+03 | -5.505222E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 95 | 3.441316E+03 |
| 96 | 2.678020E+03 | -4.638331E+03 | -5.505222E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 96 | 3.441316E+03 |
| 97 | -5.053031E+03 | 0.000000E+00 | -5.237416E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 97 | 3.469769E+03 |
| 98 | 2.526458E+03 | 4.375825E+03 | -5.237350E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 98 | 3.469611E+03 |
| 99 | 2.526458E+03 | -4.375825E+03 | -5.237350E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 99 | 3.469611E+03 |
| 100 | -4.752379E+03 | 0.000000E+00 | -4.966779E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 100 | 3.498349E+03 |
| 101 | 2.376132E+03 | 4.115460E+03 | -4.966710E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 101 | 3.498191E+03 |
| 102 | 2.376132E+03 | -4.115460E+03 | -4.966710E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 102 | 3.498191E+03 |
| 103 | -4.454182E+03 | 0.000000E+00 | -4.693439E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 103 | 3.527206E+03 |
| 104 | 2.227033E+03 | 3.857221E+03 | -4.693367E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 104 | 3.527049E+03 |
| 105 | 2.227033E+03 | -3.857221E+03 | -4.693367E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 105 | 3.527049E+03 |
| 106 | -4.158424E+03 | 0.000000E+00 | -4.417465E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 106 | 3.556333E+03 |
| 107 | 2.079154E+03 | 3.601094E+03 | -4.417389E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 107 | 3.556176E+03 |
| 108 | 2.079154E+03 | -3.601094E+03 | -4.417389E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 108 | 3.556176E+03 |
| 109 | -3.865088E+03 | 0.000000E+00 | -4.138919E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 109 | 3.585723E+03 |
| 110 | 1.932486E+03 | 3.347065E+03 | -4.138839E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 110 | 3.585566E+03 |
| 111 | 1.932486E+03 | -3.347065E+03 | -4.138839E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 111 | 3.585566E+03 |
| 112 | -3.574155E+03 | 0.000000E+00 | -3.857865E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 112 | 3.615370E+03 |
| 113 | 1.787019E+03 | 3.095117E+03 | -3.857782E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 113 | 3.615214E+03 |
| 114 | 1.787019E+03 | -3.095117E+03 | -3.857782E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 114 | 3.615214E+03 |
| 115 | -3.285607E+03 | 0.000000E+00 | -3.574364E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 115 | 3.645267E+03 |
| 116 | 1.642745E+03 | 2.845235E+03 | -3.574278E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 116 | 3.645111E+03 |
| 117 | 1.642745E+03 | -2.845235E+03 | -3.574278E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 117 | 3.645111E+03 |
| 118 | -2.999425E+03 | 0.000000E+00 | -3.288478E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 118 | 3.675408E+03 |
| 119 | 1.499654E+03 | 2.597401E+03 | -3.288387E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 119 | 3.675252E+03 |
| 120 | 1.499654E+03 | -2.597401E+03 | -3.288387E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 120 | 3.675252E+03 |
| 121 | -2.715589E+03 | 0.000000E+00 | -3.000263E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 121 | 3.705787E+03 |
| 122 | 1.357736E+03 | 2.351599E+03 | -3.000169E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 122 | 3.705631E+03 |
| 123 | 1.357736E+03 | -2.351599E+03 | -3.000169E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 123 | 3.705631E+03 |
| 124 | -2.434078E+03 | 0.000000E+00 | -2.709777E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 124 | 3.736397E+03 |
| 125 | 1.216981E+03 | 2.107812E+03 | -2.709680E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 125 | 3.736241E+03 |
| 126 | 1.216981E+03 | -2.107812E+03 | -2.709680E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 126 | 3.736241E+03 |
| 127 | -2.154874E+03 | 0.000000E+00 | -2.417077E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 127 | 3.767233E+03 |
| 128 | 1.077379E+03 | 1.866021E+03 | -2.416976E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 128 | 3.767077E+03 |
| 129 | 1.077379E+03 | -1.866021E+03 | -2.416976E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 129 | 3.767077E+03 |
| 130 | -1.877953E+03 | 0.000000E+00 | -2.122215E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 130 | 3.798288E+03 |
| 131 | 9.389192E+02 | 1.626208E+03 | -2.122111E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 131 | 3.798133E+03 |
| 132 | 9.389192E+02 | -1.626208E+03 | -2.122111E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 132 | 3.798133E+03 |
| 133 | -1.603296E+03 | 0.000000E+00 | -1.825246E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 133 | 3.829558E+03 |
| 134 | 8.015910E+02 | 1.388356E+03 | -1.825138E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 134 | 3.829403E+03 |
| 135 | 8.015910E+02 | -1.388356E+03 | -1.825138E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 135 | 3.829403E+03 |
| 136 | -1.330881E+03 | 0.000000E+00 | -1.526220E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 136 | 3.861037E+03 |
| 137 | 6.653838E+02 | 1.152445E+03 | -1.526109E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 137 | 3.860881E+03 |
| 138 | 6.653838E+02 | -1.152445E+03 | -1.526109E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 138 | 3.860881E+03 |
| 139 | -1.060686E+03 | 0.000000E+00 | -1.225189E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 139 | 3.892719E+03 |

Aug 14 09:37 1991 seadyn.out Page 23

| | | | | | | |
|---|---|---|---|---|---|---|
| 140 | 5.302868E+02 | 9.184567E+02 | -1.225074E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 |
| 141 | 5.302868E+02 | -9.184567E+02 | -1.225074E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 |
| 142 | -7.926887E+02 | 0.000000E+00 | -9.222002E+02 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 |
| 143 | 3.962889E+02 | 6.863723E+02 | -9.220818E+02 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 |
| 144 | 3.962889E+02 | -6.863723E+02 | -9.220818E+02 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 |
| 145 | -5.268680E+02 | 0.000000E+00 | -6.173020E+02 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 |
| 146 | 2.633791E+02 | 4.561726E+02 | -6.171803E+02 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 |
| 147 | 2.633791E+02 | -4.561726E+02 | -6.171803E+02 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 |
| 148 | -2.632013E+02 | 0.000000E+00 | -3.105408E+02 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 |
| 149 | 1.315464E+02 | 2.278384E+02 | -3.104157E+02 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 |
| 150 | 1.315464E+02 | -2.278384E+02 | -3.104157E+02 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 |
| 151 3 3 3 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 |
| 152 | 0.000000E+00 | 0.000000E+00 | -3.000675E+02 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 |

NUMBER OF ITERATIONS 1

__last five node pos
FLIP moved

| | |
|---|---|
| 140 | 3.892564E+03 |
| 141 | 3.892564E+03 |
| 142 | 3.924599E+03 |
| 143 | 3.924444E+03 |
| 144 | 3.924444E+03 |
| 145 | 3.956673E+03 |
| 146 | 3.956518E+03 |
| 147 | 3.956518E+03 |
| 148 | 3.991110E+03 |
| 149 | 3.990514E+03 |
| 150 | 3.990514E+03 |
| 151 | 2.250252E+03 |

__FLIP and line tensions

SEADYN--Test Case with 151 elements. hour 2.2 * /
#
/usr/1 PAGE 22

L O A D   C A S E   P A R A M E T E R S

SUBANALYSIS TYPE = LIVE

__with current

FREED NODE COMPONENTS
1511 1512
CURRENT FIELD DATA

| NUMBER | FLOW FIELD MULTIPLIER | VARIATION | CODE |
|---|---|---|---|
| 1 | 0.500000E+00 | 0 | |
| 0 | 0.100000E+01 | 0 | |
| 0 | 0.100000E+01 | 0 | |
| 0 | 0.100000E+01 | 0 | |
| 0 | 0.100000E+01 | 0 | |

__half knot

SEADYN--Test Case with 151 elements. hour 2.2 * /
#
/usr/1 PAGE 23

S O L U T I O N   O P T I O N   S U M M A R Y

ANALYSIS TYPE = LIVE
SOLUTION FORM = VRR

NO. OF STATIC STEPS = 1
OUTPUT INTERVAL = 0
OPTIONAL OUTPUT CODE = 0
RESTART FILE FLAG = 0
START UP OPTION = 0
NO. OF POINT LOADS = 0
FLOW FIELD NUMBER = 1

Aug 14 09:37 1991 seadyn.out Page 24

VISCOUS RELAXATION SOLUTION PARAMETERS
INTEGRATION PARAMETER = 0.10000E+01
INITIAL STEP SIZE = 0.10000E+01
INITIAL DAMPING = 0.10000E-02
ITERATION LIMIT = 150

*SEADYN--Test Case with 151 elements.* hour 2.2 * /

/usr/1 PAGE 24

STEADY STATE INCREMENT = 1 LOAD FACTOR 0.10000E+01

| NODE | FIXITY | X | Y | Z | VX | VY | VZ | ELT | TENSION |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 3 3 | -1.600000E+04 | 0.000000E+00 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 1 | 6.279598E+03 |
| 2 | 3 3 3 | 8.000000E+03 | 1.385600E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 2 | 2.484705E+03 |
| 3 | 3 3 3 | 8.000000E+03 | -1.385600E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 3 | 2.484705E+03 |
| 4 | | -1.562856E+04 | 4.557134E-15 | -1.182307E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 4 | 6.296489E+03 |
| 5 | | 7.963373E+03 | 1.348680E+04 | -1.184008E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 5 | 2.501860E+03 |
| 6 | | 7.963373E+03 | -1.348680E+04 | -1.184008E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 6 | 2.501860E+03 |
| 7 | | -1.525846E+04 | 9.107526E-15 | -1.164337E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 7 | 6.313678E+03 |
| 8 | | 7.919767E+03 | 1.312079E+04 | -1.167467E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 8 | 2.519604E+03 |
| 9 | | 7.919767E+03 | -1.312079E+04 | -1.167467E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 9 | 2.519604E+03 |
| 10 | | -1.488971E+04 | 1.365132E-14 | -1.146089E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 10 | 6.331163E+03 |
| 11 | | 7.869330E+03 | 1.275811E+04 | -1.150394E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 11 | 2.537916E+03 |
| 12 | | 7.869330E+03 | -1.275811E+04 | -1.150394E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 12 | 2.537916E+03 |
| 13 | | -1.452233E+04 | 1.818867E-14 | -1.127566E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 13 | 6.348943E+03 |
| 14 | | 7.812214E+03 | 1.239889E+04 | -1.132806E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 14 | 2.556773E+03 |
| 15 | | 7.812214E+03 | -1.239889E+04 | -1.132806E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 15 | 2.556773E+03 |
| 16 | | -1.415636E+04 | 2.271973E-14 | -1.108768E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 16 | 6.367017E+03 |
| 17 | | 7.748576E+03 | 1.204325E+04 | -1.114721E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 17 | 2.576155E+03 |
| 18 | | 7.748576E+03 | -1.204325E+04 | -1.114721E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 18 | 2.576155E+03 |
| 19 | | -1.379180E+04 | 2.724466E-14 | -1.089697E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 19 | 6.385385E+03 |
| 20 | | 7.678579E+03 | 1.169129E+04 | -1.096156E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 20 | 2.596043E+03 |
| 21 | | 7.678579E+03 | -1.169129E+04 | -1.096156E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 21 | 2.596043E+03 |
| 22 | | -1.342868E+04 | 3.176363E-14 | -1.070353E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 22 | 6.404044E+03 |
| 23 | | 7.602389E+03 | 1.134310E+04 | -1.077129E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 23 | 2.616420E+03 |
| 24 | | 7.602389E+03 | -1.134310E+04 | -1.077129E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 24 | 2.616420E+03 |
| 25 | | -1.306703E+04 | 3.627682E-14 | -1.050737E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 25 | 6.422994E+03 |
| 26 | | 7.520172E+03 | 1.099877E+04 | -1.057655E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 26 | 2.637268E+03 |
| 27 | | 7.520172E+03 | -1.099877E+04 | -1.057655E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 27 | 2.637268E+03 |
| 28 | | -1.270685E+04 | 4.078441E-14 | -1.030852E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 28 | 6.442234E+03 |
| 29 | | 7.432099E+03 | 1.065837E+04 | -1.037751E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 29 | 2.658570E+03 |
| 30 | | 7.432099E+03 | -1.065837E+04 | -1.037751E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 30 | 2.658570E+03 |
| 31 | | -1.234817E+04 | 4.528656E-14 | -1.010697E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 31 | 6.461762E+03 |
| 32 | | 7.338339E+03 | 1.032194E+04 | -1.017434E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 32 | 2.680308E+03 |
| 33 | | 7.338339E+03 | -1.032194E+04 | -1.017434E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 33 | 2.680308E+03 |
| 34 | | -1.199102E+04 | 4.978347E-14 | -9.902745E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 34 | 6.481578E+03 |
| 35 | | 7.239062E+03 | 9.989539E+03 | -9.967201E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 35 | 2.702468E+03 |
| 36 | | 7.239062E+03 | -9.989539E+03 | -9.967201E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 36 | 2.702468E+03 |
| 37 | | -1.163540E+04 | 5.427532E-14 | -9.695854E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 37 | 6.501679E+03 |
| 38 | | 7.134438E+03 | 9.661203E+03 | -9.756237E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 38 | 2.725032E+03 |
| 39 | | 7.134438E+03 | -9.661203E+03 | -9.756237E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 39 | 2.725032E+03 |
| 40 | | -1.128135E+04 | 5.876229E-14 | -9.486309E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 40 | 6.522066E+03 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 41 | 7.024636E+03 | 9.336958E+03 | -9.541603E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 41 | 2.747986E+03 |
| 42 | 7.024636E+03 | -9.336958E+03 | -9.541603E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 42 | 2.747986E+03 |
| 43 | -1.092888E+04 | 6.324459E-14 | -9.274123E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 43 | 6.542735E+03 |
| 44 | 6.909821E+03 | 9.016825E+03 | -9.323443E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 44 | 2.771314E+03 |
| 45 | 6.909821E+03 | -9.016825E+03 | -9.323443E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 45 | 2.771314E+03 |
| 46 | -1.057801E+04 | 6.772238E-14 | -9.059310E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 46 | 6.563687E+03 |
| 47 | 6.790158E+03 | 8.700814E+03 | -9.101901E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 47 | 2.795002E+03 |
| 48 | 6.790158E+03 | -8.700814E+03 | -9.101901E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 48 | 2.795002E+03 |
| 49 | -1.022875E+04 | 7.219588E-14 | -8.841882E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 49 | 6.584919E+03 |
| 50 | 6.665810E+03 | 8.388929E+03 | -8.877111E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 50 | 2.819035E+03 |
| 51 | 6.665810E+03 | -8.388929E+03 | -8.877111E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 51 | 2.819035E+03 |
| 52 | -9.881138E+03 | 7.666526E-14 | -8.621853E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 52 | 6.606431E+03 |
| 53 | 6.536933E+03 | 8.081166E+03 | -8.649207E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 53 | 2.843400E+03 |
| 54 | 6.536933E+03 | -8.081166E+03 | -8.649207E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 54 | 2.843400E+03 |
| 55 | -9.535181E+03 | 8.113072E-14 | -8.399236E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 55 | 6.628220E+03 |
| 56 | 6.403685E+03 | 7.777516E+03 | -8.418316E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 56 | 2.868084E+03 |
| 57 | 6.403685E+03 | -7.777516E+03 | -8.418316E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 57 | 2.868084E+03 |
| 58 | -9.190900E+03 | 8.559244E-14 | -8.174046E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 58 | 6.650286E+03 |
| 59 | 6.266218E+03 | 7.477963E+03 | -8.184561E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 59 | 2.893072E+03 |
| 60 | 6.266218E+03 | -7.477963E+03 | -8.184561E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 60 | 2.893072E+03 |
| 61 | -8.848314E+03 | 9.005062E-14 | -7.946296E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 61 | 6.672626E+03 |
| 62 | 6.124679E+03 | 7.182487E+03 | -7.948061E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 62 | 2.918354E+03 |
| 63 | 6.124679E+03 | -7.182487E+03 | -7.948061E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 63 | 2.918354E+03 |
| 64 | -8.507441E+03 | 9.450545E-14 | -7.716001E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 64 | 6.695240E+03 |
| 65 | 5.979214E+03 | 6.891063E+03 | -7.708927E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 65 | 2.943917E+03 |
| 66 | 5.979214E+03 | -6.891063E+03 | -7.708927E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 66 | 2.943917E+03 |
| 67 | -8.168299E+03 | 9.895710E-14 | -7.483175E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 67 | 6.718126E+03 |
| 68 | 5.829964E+03 | 6.603660E+03 | -7.467271E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 68 | 2.969750E+03 |
| 69 | 5.829964E+03 | -6.603660E+03 | -7.467271E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 69 | 2.969750E+03 |
| 70 | -7.830905E+03 | 1.034058E-13 | -7.247833E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 70 | 6.741283E+03 |
| 71 | 5.677064E+03 | 6.320245E+03 | -7.223196E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 71 | 2.995841E+03 |
| 72 | 5.677064E+03 | -6.320245E+03 | -7.223196E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 72 | 2.995841E+03 |
| 73 | -7.495279E+03 | 1.078516E-13 | -7.009991E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 73 | 6.764708E+03 |
| 74 | 5.520648E+03 | 6.040781E+03 | -6.976803E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 74 | 3.022180E+03 |
| 75 | 5.520648E+03 | -6.040781E+03 | -6.976803E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 75 | 3.022180E+03 |
| 76 | -7.161436E+03 | 1.122948E-13 | -6.769662E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 76 | 6.788400E+03 |
| 77 | 5.360844E+03 | 5.765228E+03 | -6.728189E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 77 | 3.048757E+03 |
| 78 | 5.360844E+03 | -5.765228E+03 | -6.728189E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 78 | 3.048757E+03 |
| 79 | -6.829394E+03 | 1.167356E-13 | -6.526863E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 79 | 6.812358E+03 |
| 80 | 5.197776E+03 | 5.493543E+03 | -6.477445E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 80 | 3.075563E+03 |
| 81 | 5.197776E+03 | -5.493543E+03 | -6.477445E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 81 | 3.075563E+03 |
| 82 | -6.499171E+03 | 1.211741E-13 | -6.281609E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 82 | 6.836580E+03 |
| 83 | 5.031566E+03 | 5.225682E+03 | -6.224659E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 83 | 3.102587E+03 |
| 84 | 5.031566E+03 | -5.225682E+03 | -6.224659E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 84 | 3.102587E+03 |
| 85 | -6.170782E+03 | 1.256105E-13 | -6.033916E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 85 | 6.861063E+03 |
| 86 | 4.862328E+03 | 4.961596E+03 | -5.969917E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 86 | 3.129821E+03 |
| 87 | 4.862328E+03 | -4.961596E+03 | -5.969917E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 87 | 3.129821E+03 |
| 88 | -5.844245E+03 | 1.300449E-13 | -5.783800E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 88 | 6.885808E+03 |
| 89 | 4.690175E+03 | 4.701238E+03 | -5.713299E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 89 | 3.157255E+03 |
| 90 | 4.690175E+03 | -4.701238E+03 | -5.713299E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 90 | 3.157255E+03 |
| 91 | -5.519576E+03 | 1.344775E-13 | -5.531277E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 91 | 6.910811E+03 |
| 92 | 4.515216E+03 | 4.444558E+03 | -5.454882E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 92 | 3.184883E+03 |
| 93 | 4.515216E+03 | -4.444558E+03 | -5.454882E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 93 | 3.184883E+03 |
| 94 | -5.196790E+03 | 1.389085E-13 | -5.276363E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 94 | 6.936071E+03 |
| 95 | 4.337554E+03 | 4.191503E+03 | -5.194739E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 95 | 3.212696E+03 |
| 96 | 4.337554E+03 | -4.191503E+03 | -5.194739E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 96 | 3.212696E+03 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 97 | | -4.875903E+03 | 1.433380E-13 | -5.019076E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 97 | 6.961586E+03 |
| 98 | | 4.157291E+03 | 3.942021E+03 | -4.932942E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 98 | 3.240686E+03 |
| 99 | | 4.157291E+03 | -3.942021E+03 | -4.932942E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 99 | 3.240686E+03 |
| 100 | | -4.556931E+03 | 1.477662E-13 | -4.759431E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 100 | 6.987355E+03 |
| 101 | | 3.974523E+03 | 3.696060E+03 | -4.669557E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 101 | 3.268846E+03 |
| 102 | | 3.974523E+03 | -3.696060E+03 | -4.669557E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 102 | 3.268846E+03 |
| 103 | | -4.239889E+03 | 1.521932E-13 | -4.497446E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 103 | 7.013375E+03 |
| 104 | | 3.789342E+03 | 3.453566E+03 | -4.404650E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 104 | 3.297169E+03 |
| 105 | | 3.789342E+03 | -3.453566E+03 | -4.404650E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 105 | 3.297169E+03 |
| 106 | | -3.924792E+03 | 1.566191E-13 | -4.233138E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 106 | 7.039646E+03 |
| 107 | | 3.601840E+03 | 3.214484E+03 | -4.138281E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 107 | 3.325649E+03 |
| 108 | | 3.601840E+03 | -3.214484E+03 | -4.138281E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 108 | 3.325649E+03 |
| 109 | | -3.611654E+03 | 1.610441E-13 | -3.966524E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 109 | 7.066164E+03 |
| 110 | | 3.412102E+03 | 2.978760E+03 | -3.870509E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 110 | 3.354279E+03 |
| 111 | | 3.412102E+03 | -2.978760E+03 | -3.870509E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 111 | 3.354279E+03 |
| 112 | | -3.300490E+03 | 1.654682E-13 | -3.697622E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 112 | 7.092928E+03 |
| 113 | | 3.220211E+03 | 2.746340E+03 | -3.601390E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 113 | 3.383053E+03 |
| 114 | | 3.220211E+03 | -2.746340E+03 | -3.601390E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 114 | 3.383053E+03 |
| 115 | | -2.991315E+03 | 1.698917E-13 | -3.426449E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 115 | 7.119936E+03 |
| 116 | | 3.026247E+03 | 2.517169E+03 | -3.330978E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 116 | 3.411966E+03 |
| 117 | | 3.026247E+03 | -2.517169E+03 | -3.330978E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 117 | 3.411966E+03 |
| 118 | | -2.684142E+03 | 1.743146E-13 | -3.153023E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 118 | 7.147186E+03 |
| 119 | | 2.830286E+03 | 2.291193E+03 | -3.059324E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 119 | 3.441011E+03 |
| 120 | | 2.830286E+03 | -2.291193E+03 | -3.059324E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 120 | 3.441011E+03 |
| 121 | | -2.378984E+03 | 1.787370E-13 | -2.877362E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 121 | 7.174676E+03 |
| 122 | | 2.632402E+03 | 2.068357E+03 | -2.786477E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 122 | 3.470184E+03 |
| 123 | | 2.632402E+03 | -2.068357E+03 | -2.786477E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 123 | 3.470184E+03 |
| 124 | | -2.075855E+03 | 1.831591E-13 | -2.599484E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 124 | 7.202405E+03 |
| 125 | | 2.432665E+03 | 1.848609E+03 | -2.512483E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 125 | 3.499479E+03 |
| 126 | | 2.432665E+03 | -1.848609E+03 | -2.512483E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 126 | 3.499479E+03 |
| 127 | | -1.774767E+03 | 1.875808E-13 | -2.319408E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 127 | 7.230370E+03 |
| 128 | | 2.231144E+03 | 1.631894E+03 | -2.237387E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 128 | 3.528892E+03 |
| 129 | | 2.231144E+03 | -1.631894E+03 | -2.237387E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 129 | 3.528892E+03 |
| 130 | | -1.475735E+03 | 1.920024E-13 | -2.037152E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 130 | 7.258569E+03 |
| 131 | | 2.027903E+03 | 1.418160E+03 | -1.961232E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 131 | 3.558418E+03 |
| 132 | | 2.027903E+03 | -1.418160E+03 | -1.961232E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 132 | 3.558418E+03 |
| 133 | | -1.178769E+03 | 1.964239E-13 | -1.752734E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 133 | 7.287001E+03 |
| 134 | | 1.823006E+03 | 1.207353E+03 | -1.684057E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 134 | 3.588052E+03 |
| 135 | | 1.823006E+03 | -1.207353E+03 | -1.684057E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 135 | 3.588052E+03 |
| 136 | | -8.838828E+02 | 2.008453E-13 | -1.466174E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 136 | 7.315662E+03 |
| 137 | | 1.616511E+03 | 9.994234E+02 | -1.405903E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 137 | 3.617791E+03 |
| 138 | | 1.616511E+03 | -9.994234E+02 | -1.405903E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 138 | 3.617791E+03 |
| 139 | | -5.910873E+02 | 2.052668E-13 | -1.177489E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 139 | 7.344552E+03 |
| 140 | | 1.408478E+03 | 7.943184E+02 | -1.126807E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 140 | 3.647629E+03 |
| 141 | | 1.408478E+03 | -7.943184E+02 | -1.126807E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 141 | 3.647629E+03 |
| 142 | | -3.003943E+02 | 2.096883E-13 | -8.866997E+02 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 142 | 7.373668E+03 |
| 143 | | 1.198962E+03 | 5.919878E+02 | -8.468030E+02 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 143 | 3.677564E+03 |
| 144 | | 1.198962E+03 | -5.919878E+02 | -8.468030E+02 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 144 | 3.677564E+03 |
| 145 | | -1.181513E+01 | 2.141101E-13 | -5.938244E+02 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 145 | 7.403007E+03 |
| 146 | | 9.880145E+02 | 3.923817E+02 | -5.659260E+02 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 146 | 3.707592E+03 |
| 147 | | 9.880145E+02 | -3.923817E+02 | -5.659260E+02 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 147 | 3.707592E+03 |
| 148 | | 2.746394E+02 | 2.185320E-13 | -2.988825E+02 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 148 | 7.432663E+03 |
| 149 | | 7.756882E+02 | 1.954508E+02 | -2.842083E+02 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 149 | 3.737797E+03 |
| 150 | | 7.756882E+02 | -1.954508E+02 | -2.842083E+02 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 150 | 3.737797E+03 |
| 151 | 3 | 5.607581E+02 | 2.229822E-13 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 151 | 2.178256E+03 |
| 152 | | 6.398981E+02 | 2.229822E-13 | -2.894409E+02 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | | |

elt 148 bruiting
current force

FLIP excursion
561 ft/ 640 ft

```
Aug 14 09:37 1991  seadyn.out Page 27

NUMBER OF ITERATIONS        6

NORMAL TERMINATION OF SEADYN
```

[redacted]

be sure last line
says, "NORMAL"

## Example Two

array.1.in
.out

Neutrally Buoyant Arrays

This is a description of array.1.in and array.1.out, the input and output files of a Seadyn run with neutrally buoyant arrays. As in the sea.9 example, the files have notes down the right side of the pages to aid in this explanation. In this run three neutrally buoyant arrays were added to the tri-moor system. The system is quite different than the one in sea.9. There are fourteen elements per mooring leg as opposed to fifty, the initial tensions in the mooring legs are much higher to accommodate the arrays, and the current is not a constant water column. The current now has a profile that is shown in figure three. This profile will be the one present in the rest of the examples.

The three arrays that have been introduced in this model are spaced 120 degrees out of phase of one another, and 60 degrees out of phase of the mooring legs. Array Alpha is between mooring legs 1 and 2, array Beta is between mooring legs 2 and 3, and array Gamma is between mooring legs 3 and 1. The arrays are about 22,000 feet long and have an excursion of 17,440 feet from FLIP in a no current situation. These arrays weigh 0.0001 lbs/ft which is almost neutrally buoyant. The last 7,500 feet of the arrays are 1 and 1/2 inch diameter, 2 in 1 nylon. The same material as the mooring lines. This weighs 0.1068 lbs/ft.

With all arrays introduced, the skipping codes are now six. For example, to follow the number one mooring leg one must look at elements 1, 7, 13, 19, and so on. The "spiralling" in this example includes the arrays, and that is why the arrays have the same number of elements as the mooring lines. For more information on "spiralling", read the FLIP Report.

Input File (array.1.in):

There is four hundred feet of anchor chain at the front of each mooring line. This had to be represented by a node four hundred ft closer to FLIP in each mooring leg. The mooring line begins its assent from these nodes. The nodes are node 7 in line one, node 9 in line two, and node 11 in line three. The beginning nodes for each array are node 2 for array Alpha, node 4 for array Beta, and node 6 for array Gamma. FLIP is described here by nodes 85 and 86, with 85 as her water line. This input is all in the NODE card.

The NGEN card is quite complex for this problem. The first, fourth, and seventh lines of this card are the nodal generations for the mooring lines. These are the same as the ones in sea.9.in except that there are only twelve nodes being generated in each leg. The nodal generation for the arrays is a much more complex matter. There are two lines for each array leg because the first 7,500 feet of the array is a different material than the rest of it. Seadyn will not accept a generation of nodes up to one point, and then a continue generating nodes of a different material. To get around these intricacies of Seadyn, the nylon line part of the array has to be generated all the way to FLIP, then the new array material generations are inserted starting at the desired node. These new generations continue up to FLIP. Seadyn then discards the previous nodes that were produced by the nylon line generations. Seadyn sticks to the last command that it receives, so it works with the new generations to give the desired mix of material. This is why the NGEN card is as long as it is. The array material picks up at node 32 in array Alpha, node 34 in array Beta, and node 36 in array Gamma. This is represented in lines three, six, and nine of the NGEN card.

The limit on nodes 7 through 30 in the LIMIT card keeps the nodes from going through the sea floor. The ELEM card is the same as in sea.9.in, but now there are five different materials, and to follow one leg at a time, six elements must be skipped between readings, as opposed to three in sea.9.in. FLIP is described in element 85. The TENS card works the same as in sea.9.in, but there are seven lines, one for each leg, and one for FLIP. Once again, the FLIP tension is assigned, and is arbitrary.

The MATE card is the same as in sea.9.in, but there are now five materials, (1) the mooring line, (2) the neutrally buoyant array, (3) FLIP, (4) the anchor chain, and (5) the 2 in 1 nylon that is at the bottom of the array legs.

The FLOW card describes the current as in figure three. The description must start at the bottom with -12,000 feet and a current of -0.338 which is 1/5 of a knot in the -x direction. Then the -500 foot current which is also -0.338 must be input followed by the 0.0 foot current which is -1.688 or 1 knot in the -x direction. Seadyn connects each current point linearly, so its representation is equivalent to the one in figure three.

The DEAD card simply tells Seadyn to calculate a no current situation, there are no FIX commands, all fixing was done in the NODE card. The LIVE card also has no FREE commands, it simply tells Seadyn to introduce the current as it is in the FLOW card, and multiply by one.

Do not forget the END card!

Output File (array.1.out):

The input is echoed here as in sea.9.out, but this output file is a "-1" code output file which means that the input is echoed, but then Seadyn skips to the DEAD output. Here the important output is the mooring line and array tensions at their interface with FLIP. In the no current situation the mooring lines all have a tension of about 5, 205 lbs per leg, and the arrays have a tension of about 655 lbs per leg. The mooring line tensions at FLIP are shown in elements 79, 81, and 83. The array tensions at FLIP are shown in elements 80, 82, and 84. The tension in element 85, which is FLIP, can be disregarded. There is a difference in some of the tensions in this no current situation because the symmetry is not exact. FLIP has moved 25 feet in the -x direction even though there is no current. This is an example of why it is best not to fix FLIP in the DEAD card.

The LIVE output shows the tension in the two upstream mooring line legs to have jumped to 8,057 lbs each at their interface with FLIP. This is shown in elements 81 and 83. The tension in the array leg that is up stream has increased in tension to 1,022 lbs. This is the array that is directly bruiting the current's force, and its tension is shown in element 82. FLIP's new water line position is -276 ft as shown in node 85's global coordinates. This means that her excursion is 251 feet down the negative "x" axis.

array.1.in

```
Test case with the array. $
* excursion of array is now 17439.
* correct current profile installed.
* current in -x direction
* array weight is .0001 lb/ft
*
*
PROB
86,85,-3,-1
FLUID
,1
NODE                          * Nodes as in ntbk.  1-2-3 anchors.
1,,-17000,0,-12000,3,3,3      * A line anchor
2,,-8720,15103,-12000,3,3,3   * ALPHA array
3,,8500,14722,-12000,3,3,3    * B line anchor
4,,17439,0,-12000,3,3,3       * BETA array
5,,8500,-14722,-12000,3,3,3   * C line anchor
6,,-8720,-15103,-12000,3,3,3  * GAMMA array
7,,-16600,0,-12000            * end of A chain
9,,8300,14376,-12000          * end of B chain
11,,8300,-14376,-12000        * end of C chain
85,,0,0,0,0,0,3               * FLIP waterline
86,,0,0,-300,0,0,0            * FLIP stern
NGEN
12,7,85,6,0,13,1,.1068,4000   * line A
13,2,86,6,0,8,1,.1068,1300    * array ALPHA
8,32,86,6,0,38,1,.0001,1300
12,9,85,6,0,15,1,.1068,4000   * line B
13,4,86,6,0,10,1,.1068,1300   * array BETA
8,34,86,6,0,40,1,.0001,1300
12,11,85,6,0,17,1,.1068,4000  * line C
13,6,86,6,0,12,1,.1068,1300   * array GAMMA
8,36,86,6,0,42,1,.0001,1300
LIMIT
1,-12000,,,1
LLOC
1,7,30,1
ELEM
1,1,7,,4,0                    * chain
2,2,8,,5,0
3,3,9,,4,0                    * chain
4,4,10,,5,0,0
5,5,11,,4,0,0                 * chain
6,6,12,,5,0,0
7,7,13,,1,0,0
8,8,14,,5,0,0
9,9,15,,1,0,0
10,10,16,,5,0,0
11,11,17,,1,0,0
12,12,18,,5,0,0
13,13,19,,1,0,0
14,14,20,,5,0,0
15,15,21,,1,0,0
16,16,22,,5,0,0
17,17,23,,1,0,0
18,18,24,,5,0,0
19,19,25,,1,0,0
20,20,26,,5,0,0
21,21,27,,1,0,0
22,22,28,,5,0,0
```

86 nodes, 85 ele
-1 output code

nodes 7,9,11
anchor chains

mooring lines star
at node 7,9,11

—sea floor

—"spiralling"
skip six

```
23,23,29,,1,0,0
24,24,30,,5,0,0
25,25,31,,1,0,0
26,26,32,,5,0,0
27,27,33,,1,0,0
28,28,34,,5,0,0
29,29,35,,1,0,0
30,30,36,,5,0,0
31,31,37,,1,0,0
32,32,38,,2,0,0
33,33,39,,1,0,0
34,34,40,,2,0,0
35,35,41,,1,0,0
36,36,42,,2,0,0
37,37,43,,1,0,0
38,38,44,,2,0,0
39,39,45,,1,0,0
40,40,46,,2,0,0
41,41,47,,1,0,0
42,42,48,,2,0,0
43,43,49,,1,0,0
44,44,50,,2,0,0
45,45,51,,1,0,0
46,46,52,,2,0,0
47,47,53,,1,0,0
48,48,54,,2,0,0
49,49,55,,1,0,0
50,50,56,,2,0,0
51,51,57,,1,0,0
52,52,58,,2,0,0
53,53,59,,1,0,0
54,54,60,,2,0,0
55,55,61,,1,0,0
56,56,62,,2,0,0
57,57,63,,1,0,0
58,58,64,,2,0,0
59,59,65,,1,0,0
60,60,66,,2,0,0
61,61,67,,1,0,0
62,62,68,,2,0,0
63,63,69,,1,0,0
64,64,70,,2,0,0
65,65,71,,1,0,0
66,66,72,,2,0,0
67,67,73,,1,0,0
68,68,74,,2,0,0
69,69,75,,1,0,0
70,70,76,,2,0,0
71,71,77,,1,0,0
72,72,78,,2,0,0
73,73,79,,1,0,0
74,74,80,,2,0,0
75,75,81,,1,0,0
76,76,82,,2,0,0
77,77,83,,1,0,0
78,78,84,,2,0,0
79,79,85,,1,0,0
80,80,86,,2,0,0
81,81,85,,1,0,0
82,82,86,,2,0,0
```

```
83,83,85,,1,0,0
84,84,86,,2,0,0
85,85,86,,3,0,0
TENS
1,79,6,1
2,80,6,2
3,81,6,3
4,82,6,4
5,83,6,5
6,84,6,6
85,85,0,,1
MATE
1,,.125,.1068W9,2000000,1         * line
2,,.125,.0001W9,200000000,1       * array
3,,17.4,110W9,1000000000,1        * FLIP
4,,.125,50W9,1000000000,1         * chain
5,,.125,.1068W9,2000000,1         * hawser
FLOW
1,2,-12000,-.338,0,0,-500,-.338,0,0,0,-1.688,0,0
DEAD
LIVE
   CURR,1,1,0
END
```

[redacted]

__calculates tension

[redacted]

__five materials

[redacted]

__current profile

[redacted]

__no FIX command
no FREE command

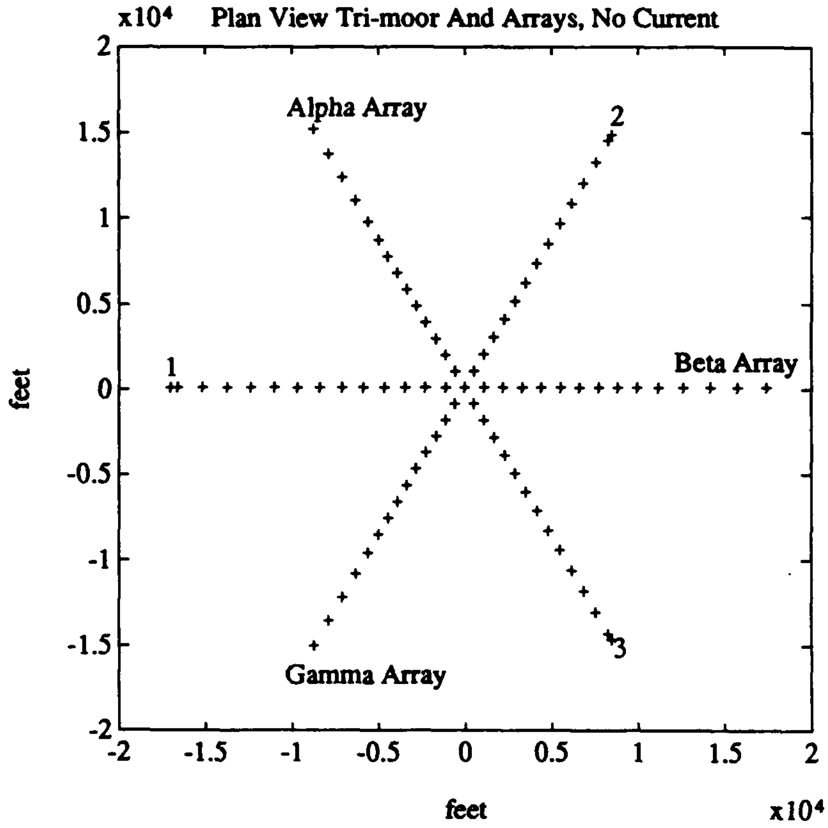

x10⁴ Plan View Tri-moor And Arrays, No Current
Alpha Array
Beta Array
Gamma Array
1
2
3
feet
feet
x10⁴
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2

Figure 6a

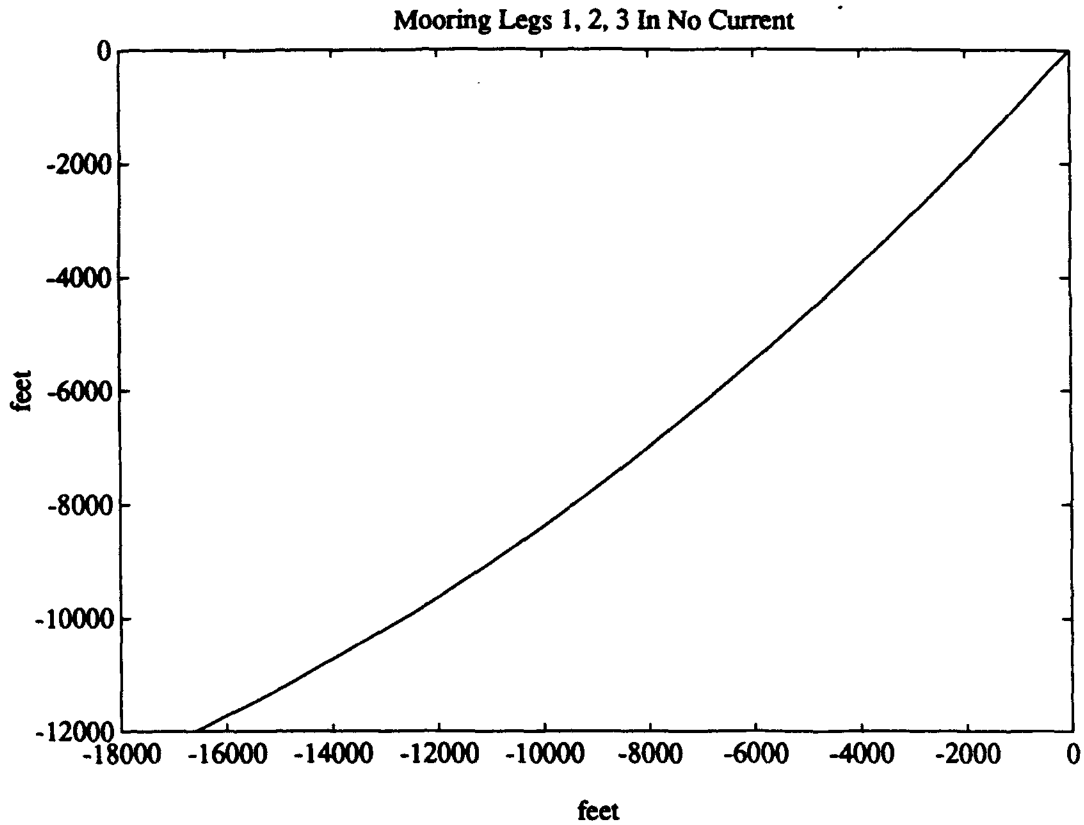

Mooring Legs 1, 2, 3 In No Current
0
-2000
-4000
-6000
-8000
-10000
-12000
feet
-18000
-16000
-14000
-12000
-10000
-8000
-6000
-4000
-2000
0
feet

Figure 6b.

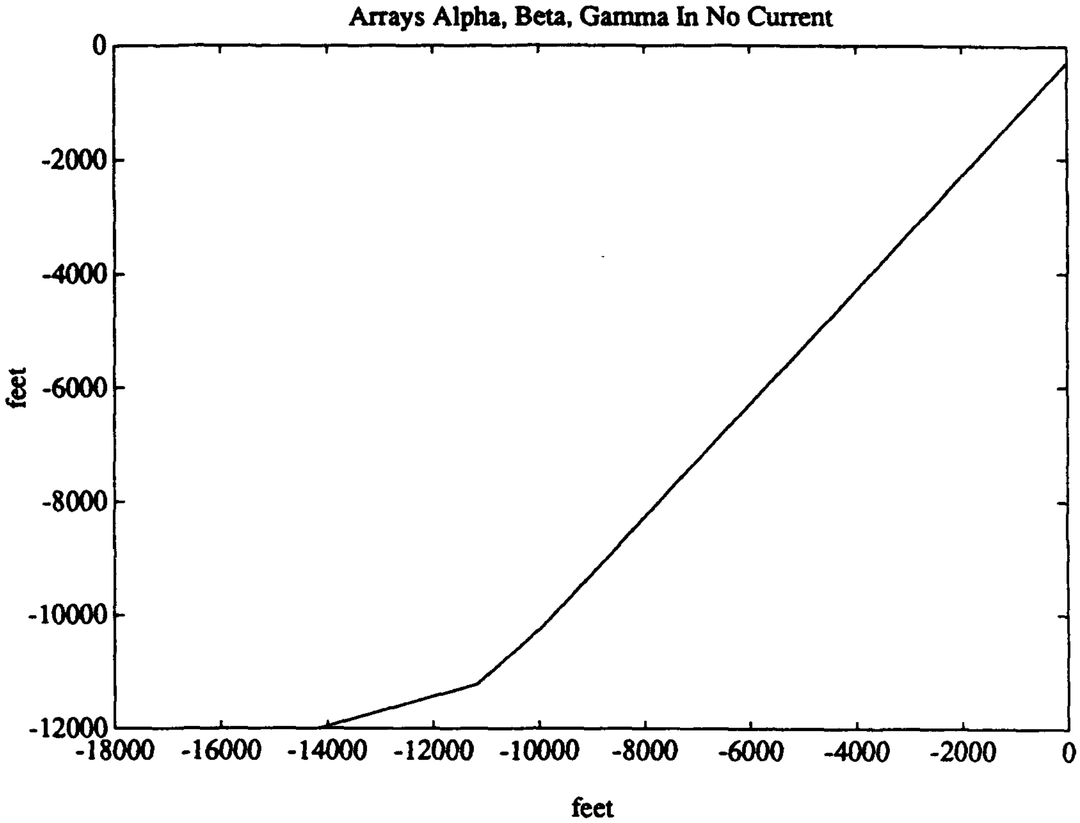



Figure 6b (continued)

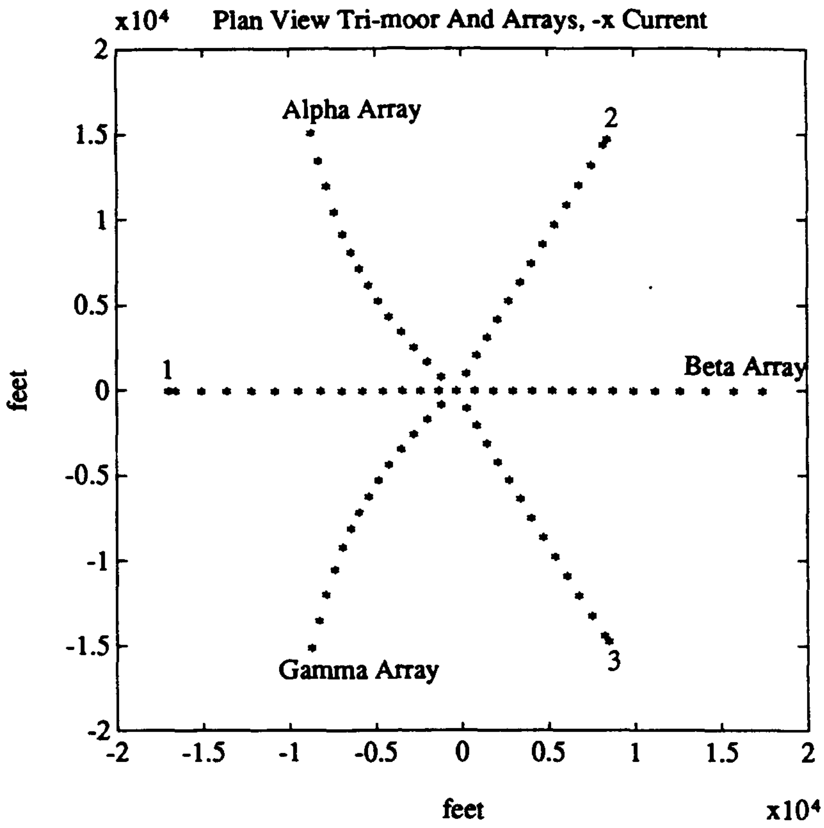
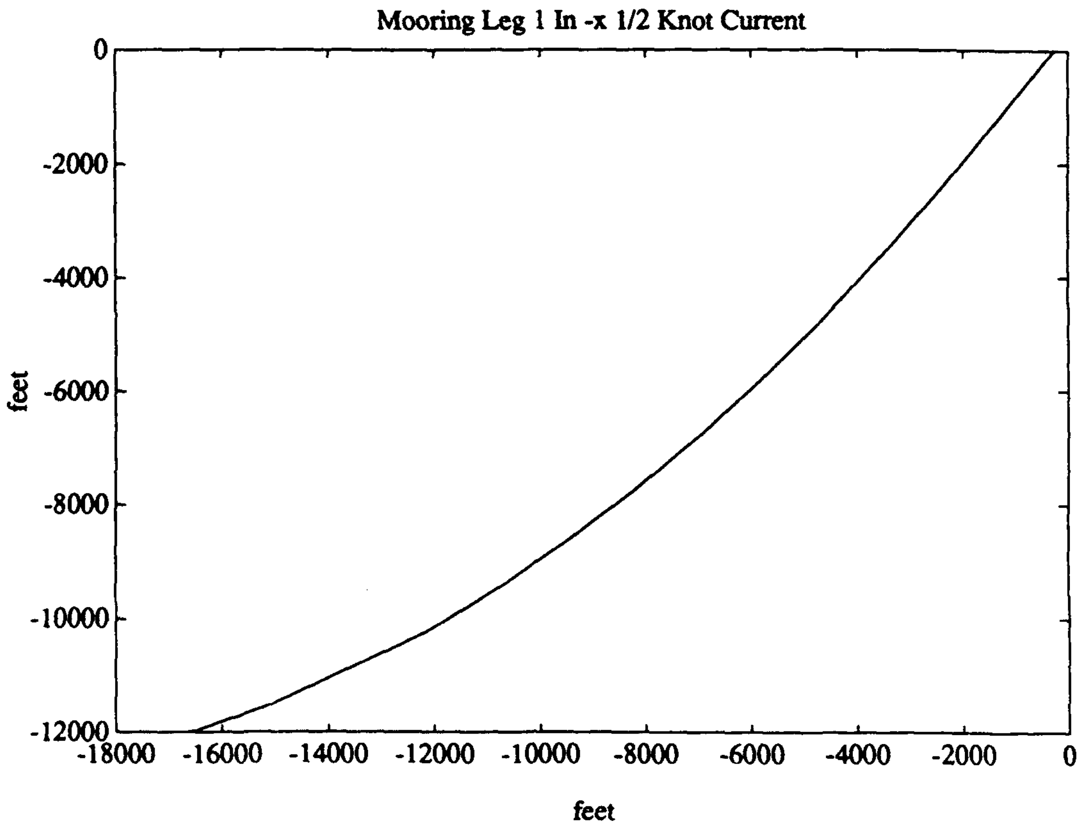

x10⁴ Plan View Tri-moor And Arrays, -x Current
Alpha Array
2
1
Beta Array
Gamma Array
3
feet
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
feet
x10⁴

Figure 6c



Mooring Leg 1 In -x 1/2 Knot Current
0
-2000
-4000
-6000
-8000
-10000
-12000
feet
-18000
-16000
-14000
-12000
-10000
-8000
-6000
-4000
-2000
0
feet


Figure 6d.

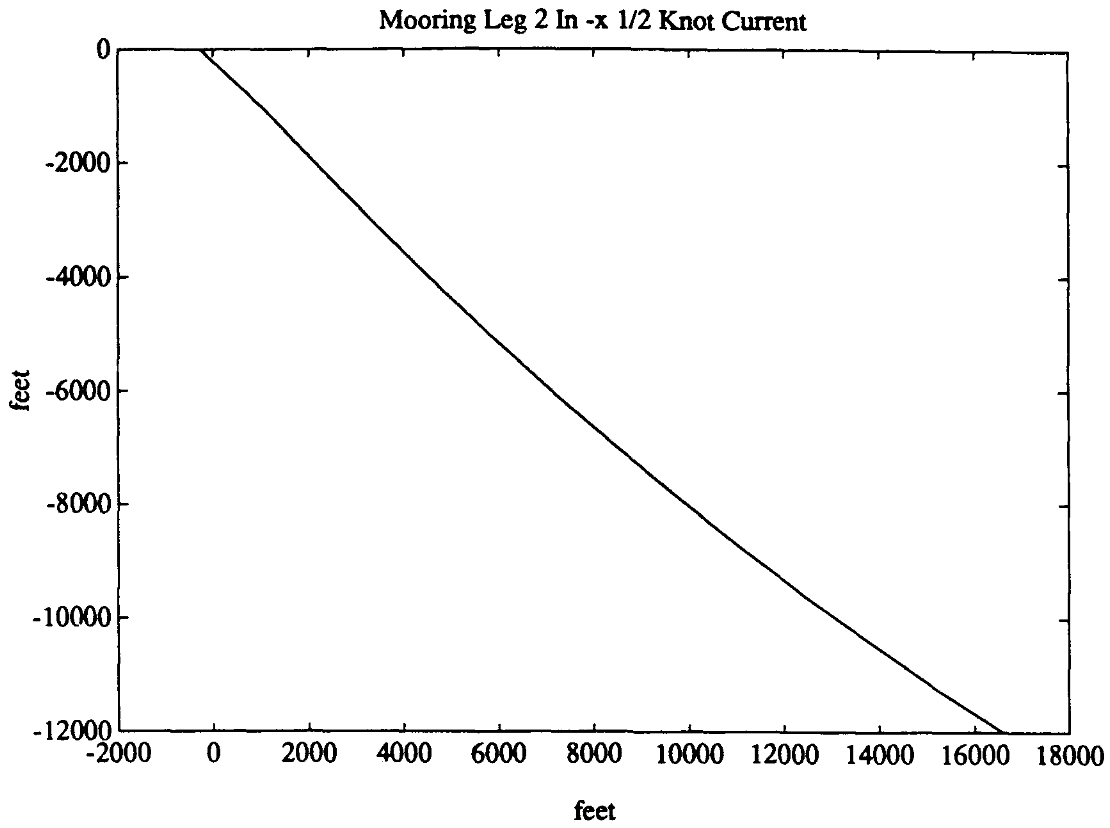



Figure 6d (continued)

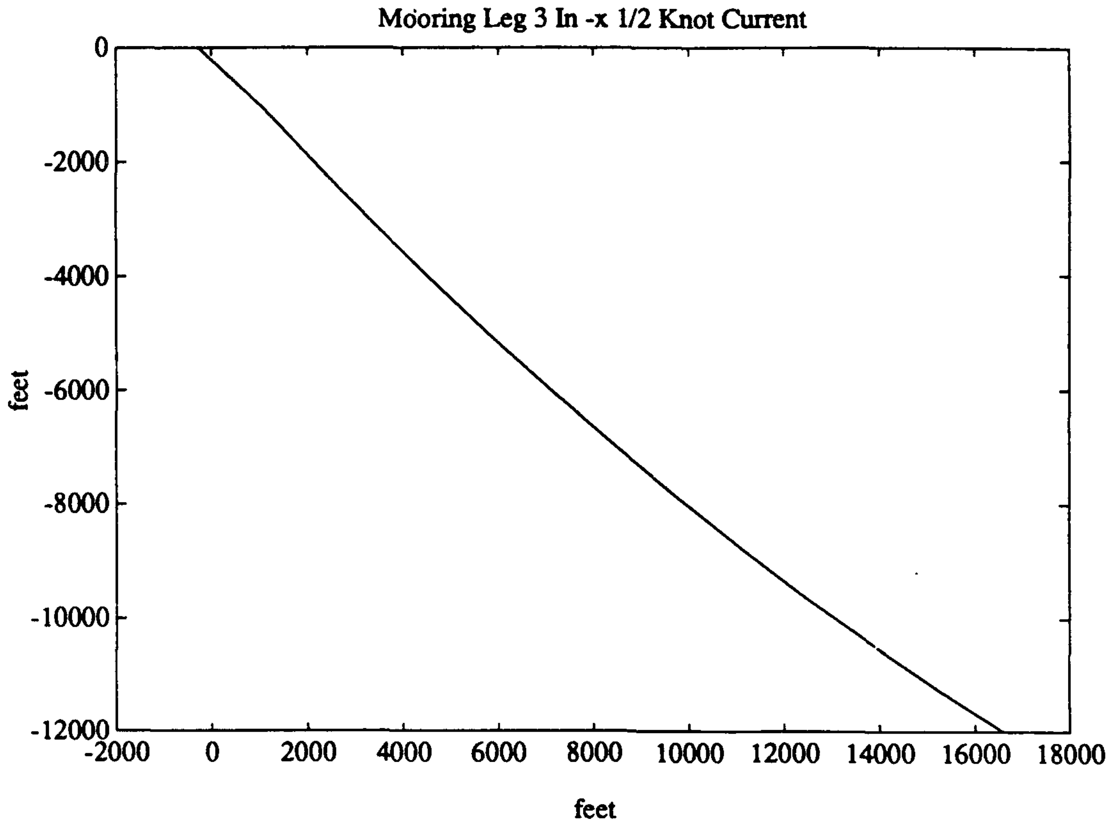

Moöring Leg 3 In -x 1/2 Knot Current
0
-2000
-4000
-6000
-8000
-10000
-12000
feet
-2000
0
2000
4000
6000
8000
10000
12000
14000
16000
18000
feet

Figure 6e

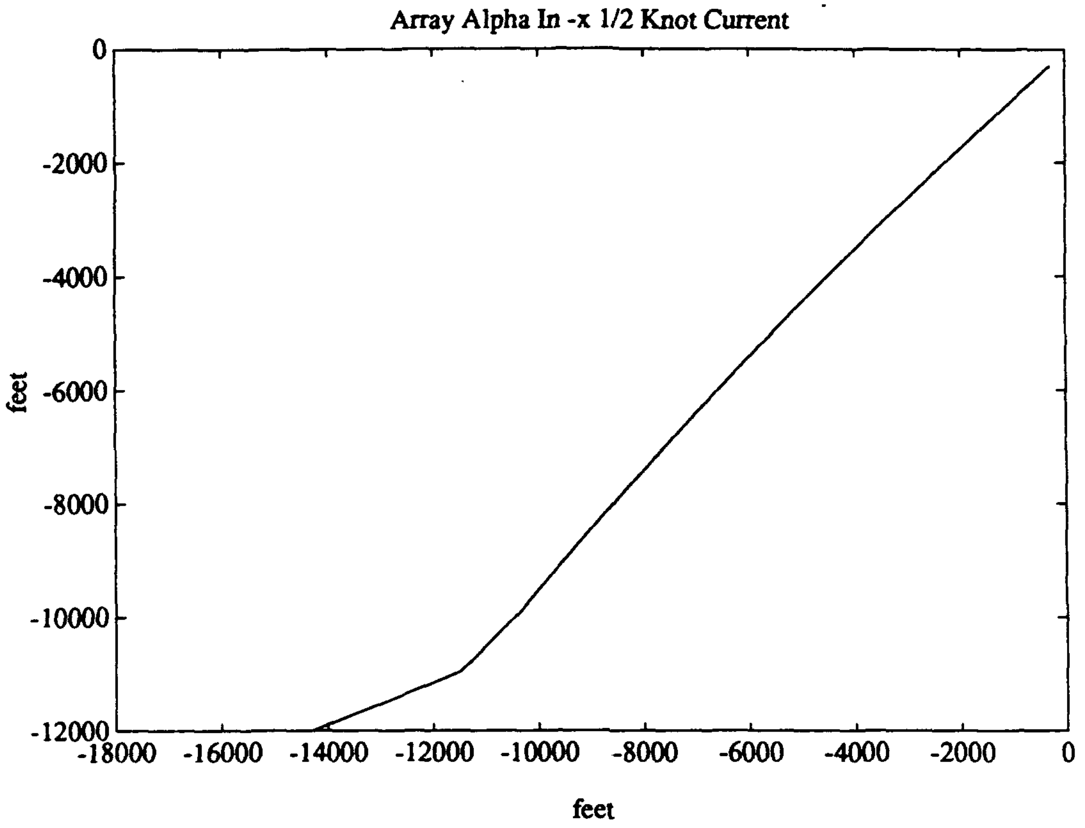



Figure 6e (continued)

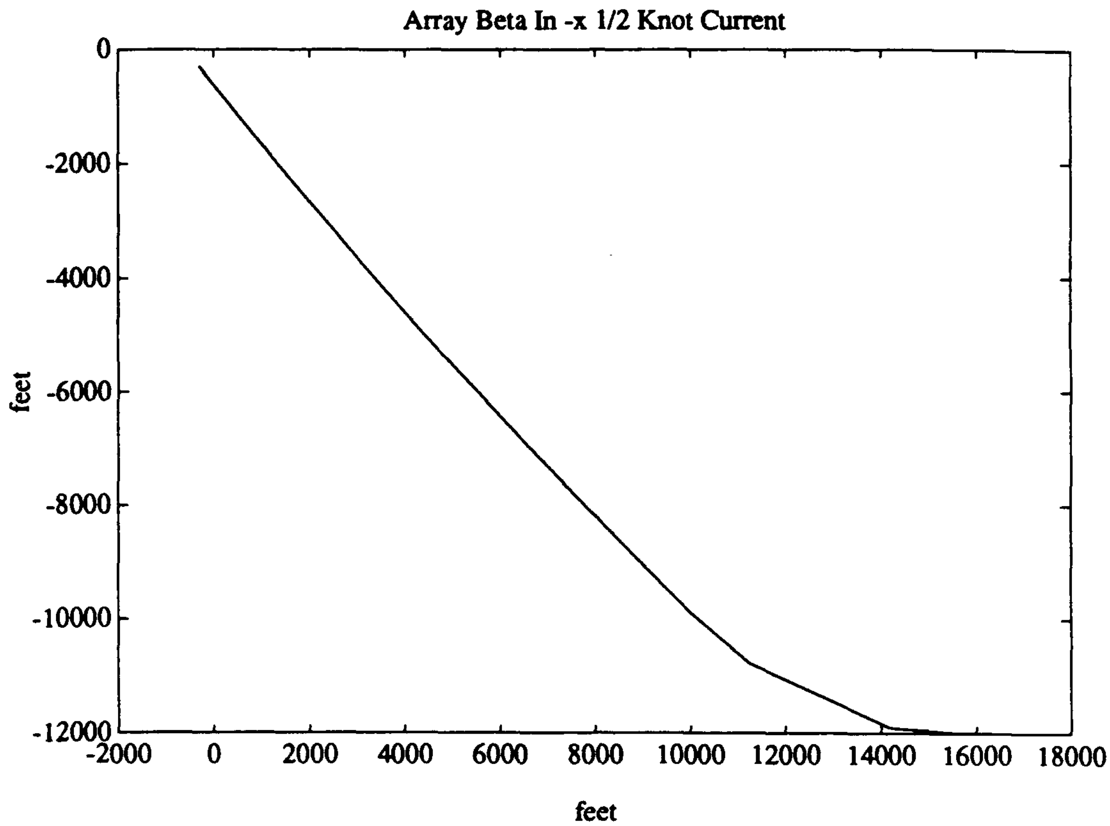

Array Beta In -x 1/2 Knot Current
0
-2000
-4000
-6000
-8000
-10000
-12000
feet
-2000
0
2000
4000
6000
8000
10000
12000
14000
16000
18000
feet

Figure 6f.

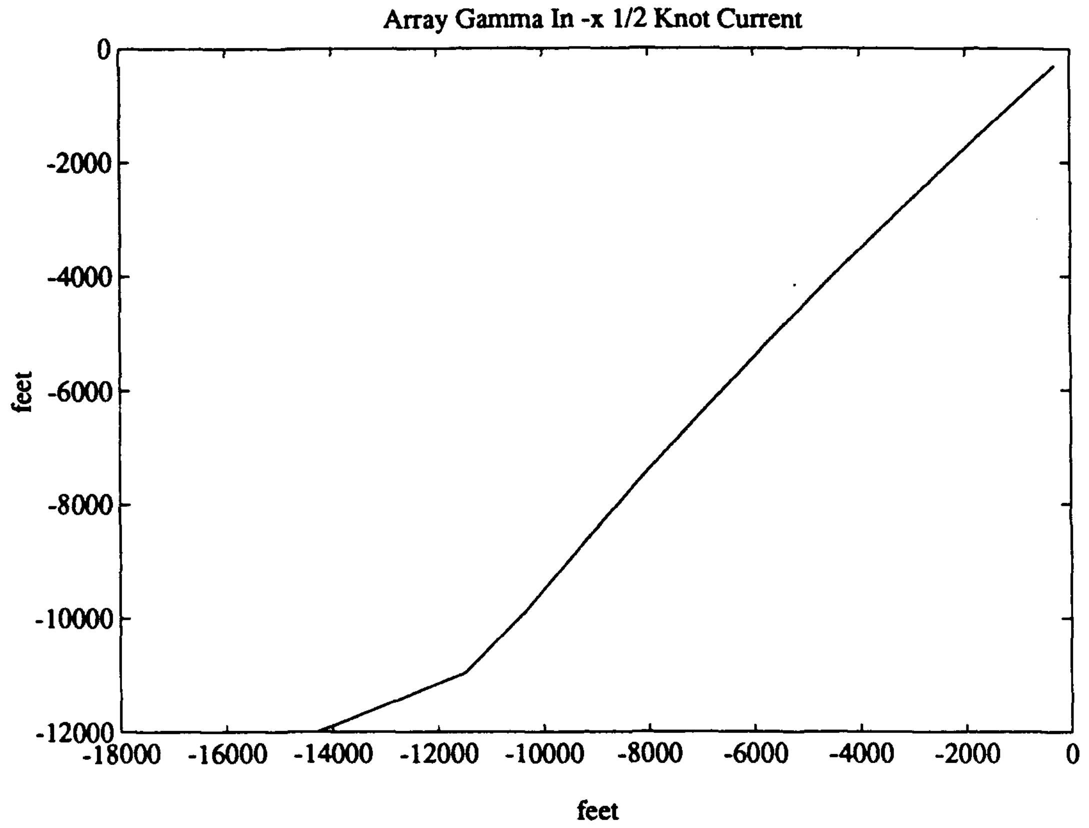



Figure 6f (continued)

```
NONLINEAR CABLE AND MOORING ANALYSIS PROGRAM -- S E A D Y N  9  0        DATE-hour 2.2 *    TIME-/
#
/usr/1
  VERSION   RLW-UNIX-23MAR91  -DP-


  MESSAGE
     DATE
 16JUL90    Modified Material Damping Input
 03JUL90    Lower case keywords enabled
 13JUN90    RESTART FILE HAS BEEN CHANGED
 13JUN90    REVISED CURR RECORD INPUT FORMAT
 20MAR89    THIS VERSION ALLOWS 250 LIMIT LOCATIONS
```

__echoing input

```
   LINE   DIRECT LIST OF INPUT DATA FOR SEADYN

     1    Test case with the array. $
     2    * excursion of array is now 17439.
     3    * correct current profile installed.
     4    * current in -x direction
     5    * array weight is .0001 lb/ft
     6    *
     7    *
     8    PROB
     9    86,85,-3,-1
    10    FLUID
    11    ,1
    12    NODE                             * Nodes as in ntbk.  1-2-3 anchors.
    13    1,,-17000,0,-12000,3,3,3         * A line anchor
    14    2,,-8720,15103,-12000,3,3,3      * ALPHA array
    15    3,,8500,14722,-12000,3,3,3       * B line anchor
    16    4,,17439,0,-12000,3,3,3          * BETA array
    17    5,,8500,-14722,-12000,3,3,3      * C line anchor
    18    6,,-8720,-15103,-12000,3,3,3     * GAMMA array
    19    7,,-16600,0,-12000               * end of A chain
    20    9,,8300,14376,-12000             * end of B chain
    21    11,,8300,-14376,-12000           * end of C chain
    22    85,,0,0,0,0,0,3                  * FLIP waterline
    23    86,,0,0,-300,0,0,0               * FLIP stern
    24    NGEN
    25    12,7,85,6,0,13,1,.1068,4000      * line A
    26    13,2,86,6,0,8,1,.1068,1300       * array ALPHA
    27    8,32,86,6,0,38,1,.0001,1300
    28    12,9,85,6,0,15,1,.1068,4000      * line B
    29    13,4,86,6,0,10,1,.1068,1300      * array BETA
    30    8,34,86,6,0,40,1,.0001,1300
    31    12,11,85,6,0,17,1,.1068,4000     * line C
    32    13,6,86,6,0,12,1,.1068,1300      * array GAMMA
    33    8,36,86,6,0,42,1,.0001,1300
```

```
LIMIT
1,-12000,,,1
LLOC
1,7,30,1
ELEM
1,1,7,,4,0                              * chain
2,2,8,,5,0
3,3,9,,4,0                              * chain
4,4,10,,5,0,0
5,5,11,,4,0,0                           * chain
6,6,12,,5,0,0
7,7,13,,1,0,0
8,8,14,,5,0,0
9,9,15,,1,0,0
10,10,16,,5,0,0
11,11,17,,1,0,0
12,12,18,,5,0,0
13,13,19,,1,0,0
14,14,20,,5,0,0
15,15,21,,1,0,0
16,16,22,,5,0,0
17,17,23,,1,0,0
18,18,24,,5,0,0
19,19,25,,1,0,0
20,20,26,,5,0,0
21,21,27,,1,0,0
22,22,28,,5,0,0
23,23,29,,1,0,0
24,24,30,,5,0,0
25,25,31,,1,0,0
26,26,32,,5,0,0
27,27,33,,1,0,0
28,28,34,,5,0,0
29,29,35,,1,0,0
30,30,36,,5,0,0
31,31,37,,1,0,0
32,32,38,,2,0,0
33,33,39,,1,0,0
34,34,40,,2,0,0
35,35,41,,1,0,0
36,36,42,,2,0,0
37,37,43,,1,0,0
38,38,44,,2,0,0
39,39,45,,1,0,0
40,40,46,,2,0,0
41,41,47,,1,0,0
42,42,48,,2,0,0
43,43,49,,1,0,0
44,44,50,,2,0,0
45,45,51,,1,0,0
46,46,52,,2,0,0
47,47,53,,1,0,0
48,48,54,,2,0,0
49,49,55,,1,0,0
50,50,56,,2,0,0
51,51,57,,1,0,0
```

```
52,52,58,,2,0,0
53,53,59,,1,0,0
54,54,60,,2,0,0
55,55,61,,1,0,0
56,56,62,,2,0,0
57,57,63,,1,0,0
58,58,64,,2,0,0
59,59,65,,1,0,0
60,60,66,,2,0,0
61,61,67,,1,0,0
62,62,68,,2,0,0
63,63,69,,1,0,0
64,64,70,,2,0,0
65,65,71,,1,0,0
66,66,72,,2,0,0
67,67,73,,1,0,0
68,68,74,,2,0,0
69,69,75,,1,0,0
70,70,76,,2,0,0
71,71,77,,1,0,0
72,72,78,,2,0,0
73,73,79,,1,0,0
74,74,80,,2,0,0
75,75,81,,1,0,0
76,76,82,,2,0,0
77,77,83,,1,0,0
78,78,84,,2,0,0
79,79,85,,1,0,0
80,80,86,,2,0,0
81,81,85,,1,0,0
82,82,86,,2,0,0
83,83,85,,1,0,0
84,84,86,,2,0,0
85,85,86,,3,0,0
TENS
1,79,6,1
2,80,6,2
3,81,6,3
4,82,6,4
5,83,6,5
6,84,6,6
85,85,0,,1
MATE
1,,.125,.1068W9,2000000,1       * line
2,,.125,.0001W9,200000000,1     * array
3,,17.4,110W9,1000000000,1      * FLIP
4,,.125,50W9,1000000000,1       * chain
5,,.125,.1068W9,2000000,1       * hawser
FLOW
1,2,-12000,-.338,0,0,-500,-.338,0,0,0,-1.688,0,0
DEAD
LIVE
   CURR,1,1,0
END
```

```
Aug 19 11:52 1991  seadyn.out Page 4

#
/usr/1          PAGE     1
         Test case with the array.

 SEADYN--Test case with the array.                                                   hour 2.2 *    /
#
/usr/1    PAGE     2

 N E W   P R O B L E M   D A T A

         NUMBER OF   NODES    =      86
         NUMBER OF ELEMENTS   =      85     NBASE  =     12761
         GRAVITY DIRECTION    =      -3     NIBASE =      1785
         INPUT ECHO FLAG      =      -1
         SHIP LOAD FILE FLAG =        0

         GRAVITATIONAL ACCELERATION =    0.321740E+02
              MATERIAL DAMPING RATIOS FOR (CA1,EA1)    0.500000E-02    0.000000E+00
              MATERIAL DAMPING RATIOS FOR (CA1,EA1)    0.500000E-02    0.000000E+00
              MATERIAL DAMPING RATIOS FOR (CA1,EA1)    0.500000E-02    0.000000E+00
              MATERIAL DAMPING RATIOS FOR (CA1,EA1)    0.500000E-02    0.000000E+00
              MATERIAL DAMPING RATIOS FOR (CA1,EA1)    0.500000E-02    0.000000E+00

  KEY TO STANDARD OUTPUT FIXITY CODES FOR NODAL DISPLACEMENTS
      CODE     EXPLANTION
        1      FIXED, BUT MAY BE SUBJECT TO SPECIFIED LIMIT SET
        2      FIXED WHILE RESERVED FOR PAYOUT
        3      UNCONDITIONALLY FIXED
        M      DYNAMICALLY MOVED
        H      HELD WITH AN IMPOSED DISPLACEMENT
        S      SLAVE COMPONENT
        B      BUOY HELD AT SURFACE LIMIT
               FREE (UNCONSTRAINED) COMPONENT

 SEADYN--Test case with the array.                                                   hour 2.2 *    /
#
/usr/1    PAGE     3

 L O A D   C A S E   P A R A M E T E R S

         SUBANALYSIS TYPE = DEAD


 SEADYN--Test case with the array.                                                   hour 2.2 *    /
#
/usr/1    PAGE     4
```

[redacted]

__this is a shortene
form of output

[redacted]

__straight to DEAD

Aug 19 11:52 1991 seadyn.out Page 5

[redacted]

—no current

S O L U T I O N   O P T I O N   S U M M A R Y

```
        ANALYSIS TYPE = DEAD
        SOLUTION FORM = VRR

        NO. OF STATIC STEPS   =    1
        OUTPUT INTERVAL       =    0
        OPTIONAL OUTPUT CODE  =    0
        RESTART FILE FLAG     =    0
        START UP OPTION       =    0
        NO. OF POINT LOADS    =    0
        FLOW FIELD NUMBER     =    0
        VISCOUS RELAXATION SOLUTION PARAMETERS
          INTEGRATION PARAMETER  =   0.10000E+01
          INITIAL STEP SIZE      =     0.10000E+01
          INITIAL DAMPING        =     0.10000E-02
          ITERATION LIMIT        =  150
```

SEADYN--Test case with the array.                hour 2.2 *   /

/usr/1   PAGE   5

DEAD LOAD INCREMENT =   1   LOAD FACTOR   0.10000E+01

| NODE | FIXITY | | | X | Y | Z | VX | VY | VZ | ELT | TENSION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 3 | 3 | -1.700000E+04 | 0.000000E+00 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 1 | 3.684947E+03 |
| 2 | 3 | 3 | 3 | -8.720000E+03 | 1.510300E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 2 | 4.610852E+02 |
| 3 | 3 | 3 | 3 | 8.500000E+03 | 1.472200E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 3 | 3.653994E+03 |
| 4 | 3 | 3 | 3 | 1.743900E+04 | 0.000000E+00 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 4 | 4.827715E+02 |
| 5 | 3 | 3 | 3 | 8.500000E+03 | -1.472200E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 5 | 3.653994E+03 |
| 6 | 3 | 3 | 3 | -8.720000E+03 | -1.510300E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 6 | 4.610852E+02 |
| 7 | | | 1 | -1.660000E+04 | 7.721616E-16 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 7 | 4.060615E+03 |
| 8 | | | 1 | -7.879419E+03 | 1.364292E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 8 | 4.610852E+02 |
| 9 | | | 1 | 8.299724E+03 | 1.437616E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 9 | 4.020087E+03 |
| 10 | | | 1 | 1.575707E+04 | 3.317662E-16 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 10 | 4.827715E+02 |
| 11 | | | 1 | 8.299724E+03 | -1.437616E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 11 | 4.020087E+03 |
| 12 | | | 1 | -7.879419E+03 | -1.364292E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 12 | 4.610852E+02 |
| 13 | | | | -1.516196E+04 | 3.548847E-15 | -1.133432E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 13 | 4.134407E+03 |
| 14 | | | 1 | -7.092144E+03 | 1.227543E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 14 | 4.627186E+02 |
| 15 | | | | 7.576859E+03 | 1.312790E+04 | -1.133832E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 15 | 4.093500E+03 |
| 16 | | | 1 | 1.418126E+04 | 6.425999E-16 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 16 | 4.859481E+02 |
| 17 | | | | 7.576859E+03 | -1.312790E+04 | -1.133832E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 17 | 4.093500E+03 |
| 18 | | | 1 | -7.092144E+03 | -1.227543E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 18 | 4.627186E+02 |
| 19 | | | | -1.374958E+04 | 6.275815E-15 | -1.061578E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 19 | 4.213677E+03 |
| 20 | | | | -6.307620E+03 | 1.091272E+04 | -1.186753E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 20 | 5.055577E+02 |
| 21 | | | | 6.866938E+03 | 1.190199E+04 | -1.062292E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 21 | 4.172482E+03 |
| 22 | | | | 1.261573E+04 | 1.532905E-15 | -1.182016E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 22 | 5.320917E+02 |
| 23 | | | | 6.866938E+03 | -1.190199E+04 | -1.062292E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 23 | 4.172482E+03 |
| 24 | | | | -6.307620E+03 | -1.091272E+04 | -1.186753E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 24 | 5.055577E+02 |
| 25 | | | | -1.236377E+04 | 8.951369E-15 | -9.847238E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 25 | 4.298121E+03 |
| 26 | | | | -5.589519E+03 | 9.665383E+03 | -1.122033E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 26 | 5.948591E+02 |
| 27 | | | | 6.170435E+03 | 1.069925E+04 | -9.856697E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 27 | 4.256722E+03 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 28 | 1.118590E+04 | 2.217413E-15 | -1.115758E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 28 | 6.219595E+02 |
| 29 | 6.170435E+03 | -1.069925E+04 | -9.856697E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 29 | 4.256722E+03 |
| 30 | -5.589519E+03 | -9.665383E+03 | -1.122033E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 30 | 5.948591E+02 |
| 31 | -1.100518E+04 | 1.157428E-14 | -9.031533E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 31 | 4.387439E+03 |
| 32 | -4.979155E+03 | 8.605186E+03 | -1.022315E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 32 | 6.514302E+02 |
| 33 | 5.487695E+03 | 9.520273E+03 | -9.042549E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 33 | 4.345914E+03 |
| 34 | 9.962399E+03 | 4.065080E-14 | -1.016427E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 34 | 6.781810E+02 |
| 35 | 5.487695E+03 | -9.520273E+03 | -9.042549E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 35 | 4.345914E+03 |
| 36 | -4.979155E+03 | -8.605186E+03 | -1.022315E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 36 | 6.514302E+02 |
| 37 | -9.674246E+03 | 1.414375E-14 | -8.171437E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 37 | 4.481339E+03 |
| 38 | -4.428465E+03 | 7.648642E+03 | -9.121600E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 38 | 6.515404E+02 |
| 39 | 4.818945E+03 | 8.365458E+03 | -8.183311E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 39 | 4.439759E+03 |
| 40 | 8.852234E+03 | 8.262431E-14 | -9.069232E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 40 | 6.782969E+02 |
| 41 | 4.818945E+03 | -8.365458E+03 | -8.183311E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 41 | 4.439759E+03 |
| 42 | -4.428465E+03 | -7.648642E+03 | -9.121600E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 42 | 6.515404E+02 |
| 43 | -8.371197E+03 | 1.665936E-14 | -7.269647E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 43 | 4.579539E+03 |
| 44 | -3.877868E+03 | 6.692259E+03 | -8.019859E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 44 | 6.516505E+02 |
| 45 | 4.164308E+03 | 7.235014E+03 | -7.281738E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 45 | 4.537969E+03 |
| 46 | 7.742248E+03 | 1.234647E-13 | -7.974017E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 46 | 6.784133E+02 |
| 47 | 4.164308E+03 | -7.235014E+03 | -7.281738E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 47 | 4.537969E+03 |
| 48 | -3.877868E+03 | -6.692259E+03 | -8.019859E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 48 | 6.516505E+02 |
| 49 | -7.096086E+03 | 1.912101E-14 | -6.328760E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 49 | 4.681766E+03 |
| 50 | -3.327364E+03 | 5.736039E+03 | -6.917931E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 50 | 6.517607E+02 |
| 51 | 3.523816E+03 | 6.128995E+03 | -6.340484E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 51 | 4.640266E+03 |
| 52 | 6.632442E+03 | 1.631655E-13 | -6.878620E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 52 | 6.785302E+02 |
| 53 | 3.523816E+03 | -6.128995E+03 | -6.340484E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 53 | 4.640266E+03 |
| 54 | -3.327364E+03 | -5.736039E+03 | -6.917931E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 54 | 6.517607E+02 |
| 55 | -5.848813E+03 | 2.152892E-14 | -5.351263E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 55 | 4.787761E+03 |
| 56 | -2.776953E+03 | 4.779980E+03 | -5.815815E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 56 | 6.518710E+02 |
| 57 | 2.897420E+03 | 5.047320E+03 | -5.362088E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 57 | 4.746386E+03 |
| 58 | 5.522815E+03 | 2.017208E-13 | -5.783041E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 58 | 6.786476E+02 |
| 59 | 2.897420E+03 | -5.047320E+03 | -5.362088E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 59 | 4.746386E+03 |
| 60 | -2.776953E+03 | -4.779980E+03 | -5.815815E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 60 | 6.518710E+02 |
| 61 | -4.629151E+03 | 2.388352E-14 | -4.339519E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 61 | 4.897279E+03 |
| 62 | -2.226635E+03 | 3.824083E+03 | -4.713514E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 62 | 6.519812E+02 |
| 63 | 2.285007E+03 | 3.989788E+03 | -4.348964E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 63 | 4.856076E+03 |
| 64 | 4.413368E+03 | 2.391249E-13 | -4.687281E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 64 | 6.787656E+02 |
| 65 | 2.285007E+03 | -3.989788E+03 | -4.348964E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 65 | 4.856076E+03 |
| 66 | -2.226635E+03 | -3.824083E+03 | -4.713514E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 66 | 6.519812E+02 |
| 67 | -3.436761E+03 | 2.618548E-14 | -3.295766E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 67 | 5.010088E+03 |
| 68 | -1.676410E+03 | 2.868347E+03 | -3.611025E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 68 | 6.520915E+02 |
| 69 | 1.686403E+03 | 2.956103E+03 | -3.303396E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 69 | 4.969102E+03 |
| 70 | 3.304100E+03 | 2.753730E-13 | -3.591339E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 70 | 6.788841E+02 |
| 71 | 1.686403E+03 | -2.956103E+03 | -3.303396E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 71 | 4.969102E+03 |
| 72 | -1.676410E+03 | -2.868347E+03 | -3.611025E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 72 | 6.520915E+02 |
| 73 | -2.271217E+03 | 2.843562E-14 | -2.222112E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 73 | 5.125968E+03 |
| 74 | -1.126278E+03 | 1.912773E+03 | -2.508350E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 74 | 6.522018E+02 |
| 75 | 1.101391E+03 | 1.945890E+03 | -2.227536E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 75 | 5.085239E+03 |
| 76 | 2.195011E+03 | 3.104604E-13 | -2.495216E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 76 | 6.790032E+02 |
| 77 | 1.101391E+03 | -1.945890E+03 | -2.227536E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 77 | 5.085239E+03 |
| 78 | -1.126278E+03 | -1.912773E+03 | -2.508350E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 78 | 6.522018E+02 |
| 79 | -1.132019E+03 | 3.063490E-14 | -1.120538E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 79 | 5.244343E+03 |
| 80 | -5.762393E+02 | 9.573605E+02 | -1.405489E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 80 | 6.523147E+02 |
| 81 | 5.297171E+02 | 9.587084E+02 | -1.123403E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 81 | 5.203905E+03 |
| 82 | 1.086101E+03 | 3.443830E-13 | -1.398912E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 82 | 6.795328E+02 |
| 83 | 5.297171E+02 | -9.587084E+02 | -1.123403E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 83 | 5.203905E+03 |

— mooring line ten
elem. 79,81,83

— array tension
lem. --,82

```
    84           -5.762393E+02  -9.573605E+02  -1.405489E+03   0.000000E+00   0.000000E+00   0.000000E+00        84   6.523147E+02
    85        3  -2.546814E+01   3.277116E-14   0.000000E+00   0.000000E+00   0.000000E+00   0.000000E+00        85   1.790178E+04
    86           -2.507898E+01   3.542339E-13  -3.000051E+02   0.000000E+00   0.000000E+00   0.000000E+00
 NUMBER OF ITERATIONS         6
```

[redacted]

disregard 85 tens

SEADYN--Test case with the array. hour 2.2 * /

/usr/1 PAGE 6

L O A D   C A S E   P A R A M E T E R S

[redacted]

—with current

```
        SUBANALYSIS TYPE - LIVE

        CURRENT FIELD DATA
             NUMBER      FLOW FIELD MULTIPLIER      VARIATION  CODE
                1              0.100000E+01             0
                0              0.100000E+01             0
                0              0.100000E+01             0
                0              0.100000E+01             0
                0              0.100000E+01             0
```

SEADYN--Test case with the array. hour 2.2 * /

/usr/1 PAGE 7

S O L U T I O N   O P T I O N   S U M M A R Y

```
        ANALYSIS TYPE - LIVE
        SOLUTION FORM - VRR

        NO. OF STATIC STEPS   =    1
        OUTPUT INTERVAL       =    0
        OPTIONAL OUTPUT CODE  =    0
        RESTART FILE FLAG     =    0
        START UP OPTION       =    0
        NO. OF POINT LOADS    =    0
        FLOW FIELD NUMBER     =    1
        VISCOUS RELAXATION SOLUTION PARAMETERS
          INTEGRATION PARAMETER   =    0.10000E+01
          INITIAL STEP SIZE       =     0.10000E+01
          INITIAL DAMPING         =     0.10000E-02
          ITERATION LIMIT         =   150
```

SEADYN--Test case with the array. hour 2.2 * /

/usr/1 PAGE 8

STEADY STATE INCREMENT = 1 LOAD FACTOR 0.10000E+01

| NODE | FIXITY | | | X | Y | Z | VX | VY | VZ | ELT | TENSION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 3 | 3 | -1.700000E+04 | 0.000000E+00 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 1 | 2.086937E+03 |
| 2 | 3 | 3 | 3 | -8.720000E+03 | 1.510300E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 2 | 4.558499E+02 |
| 3 | 3 | 3 | 3 | 8.500000E+03 | 1.472200E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 3 | 6.044370E+03 |
| 4 | 3 | 3 | 3 | 1.743900E+04 | 0.000000E+00 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 4 | 8.031608E+02 |
| 5 | 3 | 3 | 3 | 8.500000E+03 | -1.472200E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 5 | 6.044370E+03 |
| 6 | 3 | 3 | 3 | -8.720000E+03 | -1.510300E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 6 | 4.558501E+02 |
| 7 | | | 1 | -1.660000E+04 | 8.329457E-08 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 7 | 2.192150E+03 |
| 8 | | | 1 | -8.267061E+03 | 1.348027E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 8 | 4.558499E+02 |
| 9 | | | 1 | 8.287321E+03 | 1.438364E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 9 | 6.881371E+03 |
| 10 | | | 1 | 1.575680E+04 | -4.687457E-04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 10 | 8.043580E+02 |
| 11 | | | 1 | 8.287321E+03 | -1.438364E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 11 | 6.881371E+03 |
| 12 | | | 1 | -8.267061E+03 | -1.348027E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 12 | 4.558501E+02 |
| 13 | | | | -1.509215E+04 | 3.811353E-07 | -1.151750E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 13 | 2.250349E+03 |
| 14 | | | 1 | -7.842845E+03 | 1.196045E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 14 | 4.636640E+02 |
| 15 | | | | 7.546755E+03 | 1.320080E+04 | -1.123966E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 15 | 6.963693E+03 |
| 16 | | | | 1.418426E+04 | -9.079532E-04 | -1.189475E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 16 | 8.315691E+02 |
| 17 | | | | 7.546755E+03 | -1.320080E+04 | -1.123966E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 17 | 6.963693E+03 |
| 18 | | | 1 | -7.842845E+03 | -1.196045E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 18 | 4.636641E+02 |
| 19 | | | | -1.362180E+04 | 6.381113E-07 | -1.093057E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 19 | 2.319146E+03 |
| 20 | | | | -7.383306E+03 | 1.047869E+04 | -1.171151E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 20 | 5.213526E+02 |
| 21 | | | | 6.819513E+03 | 1.202995E+04 | -1.044840E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 21 | 7.049255E+03 |
| 22 | | | | 1.266580E+04 | -1.337665E-03 | -1.147240E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 22 | 8.906754E+02 |
| 23 | | | | 6.819513E+03 | -1.202995E+04 | -1.044840E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 23 | 7.049255E+03 |
| 24 | | | | -7.383306E+03 | -1.047869E+04 | -1.171151E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 24 | 5.213527E+02 |
| 25 | | | | -1.219317E+04 | 8.525750E-07 | -1.024837E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 25 | 2.397547E+03 |
| 26 | | | | -6.899611E+03 | 9.182098E+03 | -1.095302E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 26 | 6.197640E+02 |
| 27 | | | | 6.105678E+03 | 1.087141E+04 | -9.627283E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 27 | 7.137943E+03 |
| 28 | | | | 1.125242E+04 | -1.749174E-03 | -1.077478E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 28 | 9.764227E+02 |
| 29 | | | | 6.105678E+03 | -1.087141E+04 | -9.627283E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 29 | 7.137943E+03 |
| 30 | | | | -6.899611E+03 | -9.182098E+03 | -1.095302E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 30 | 6.197640E+02 |
| 31 | | | | -1.080887E+04 | 1.025644E-06 | -9.480199E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 31 | 2.484567E+03 |
| 32 | | | | -6.429792E+03 | 8.106763E+03 | -9.897601E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 32 | 6.788368E+02 |
| 33 | | | | 5.405297E+03 | 9.725421E+03 | -8.777371E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 33 | 7.229645E+03 |
| 34 | | | | 9.970844E+03 | -2.137316E-03 | -9.857135E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 34 | 1.027385E+03 |
| 35 | | | | 5.405297E+03 | -9.725421E+03 | -8.777371E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 35 | 7.229645E+03 |
| 36 | | | | -6.429792E+03 | -8.106763E+03 | -9.897601E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 36 | 6.788366E+02 |
| 37 | | | | -9.470136E+03 | 1.160361E-06 | -8.635100E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 37 | 2.579270E+03 |
| 38 | | | | -5.949645E+03 | 7.148748E+03 | -8.764762E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 38 | 6.790808E+02 |
| 39 | | | | 4.718389E+03 | 8.592190E+03 | -7.899708E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 39 | 7.324249E+03 |
| 40 | | | | 8.776614E+03 | -2.519704E-03 | -8.854445E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 40 | 1.026856E+03 |
| 41 | | | | 4.718389E+03 | -8.592190E+03 | -7.899708E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 41 | 7.324250E+03 |
| 42 | | | | -5.949645E+03 | -7.148748E+03 | -8.764761E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 42 | 6.790807E+02 |
| 43 | | | | -8.177115E+03 | 1.260890E-06 | -7.721588E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 43 | 2.680783E+03 |
| 44 | | | | -5.414991E+03 | 6.203022E+03 | -7.646099E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 44 | 6.793514E+02 |
| 45 | | | | 4.044946E+03 | 7.471886E+03 | -6.995322E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 45 | 7.421648E+03 |
| 46 | | | | 7.594093E+03 | -2.921087E-03 | -7.837972E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 46 | 1.026385E+03 |
| 47 | | | | 4.044946E+03 | -7.471886E+03 | -6.995322E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 47 | 7.421648E+03 |
| 48 | | | | -5.414992E+03 | -6.203022E+03 | -7.646098E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 48 | 6.793513E+02 |
| 49 | | | | -6.929100E+03 | 1.331864E-06 | -6.747479E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 49 | 2.788316E+03 |
| 50 | | | | -4.827992E+03 | 5.270500E+03 | -6.542698E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 50 | 6.796497E+02 |
| 51 | | | | 3.384929E+03 | 6.364639E+03 | -6.065224E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 51 | 7.521733E+03 |
| 52 | | | | 6.423775E+03 | -3.345579E-03 | -6.807474E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 52 | 1.025987E+03 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 53 | | 3.384929E+03 | -6.364639E+03 | -6.065224E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 53 | 7.521733E+03 |
| 54 | | -4.827993E+03 | -5.270500E+03 | -6.542697E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 54 | 6.796496E+02 |
| 55 | | -5.724786E+03 | 1.377920E-06 | -5.719819E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 55 | 2.901163E+03 |
| 56 | | -4.190890E+03 | 4.351956E+03 | -5.455482E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 56 | 6.799769E+02 |
| 57 | | 2.738281E+03 | 5.270543E+03 | -5.110404E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 57 | 7.624400E+03 |
| 58 | | 5.266175E+03 | -3.798028E-03 | -5.762708E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 58 | 1.025704E+03 |
| 59 | | 2.738281E+03 | -5.270543E+03 | -5.110404E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 59 | 7.624401E+03 |
| 60 | | -4.190891E+03 | -4.351956E+03 | -5.455482E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 60 | 6.799765E+02 |
| 61 | | -4.562466E+03 | 1.403403E-06 | -4.644878E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 61 | 3.018697E+03 |
| 62 | | -3.505977E+03 | 3.448031E+03 | -4.385214E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 62 | 6.803353E+02 |
| 63 | | 2.104918E+03 | 4.189662E+03 | -4.131829E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 63 | 7.729548E+03 |
| 64 | | 4.121833E+03 | -4.286028E-03 | -4.703438E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 64 | 1.037540E+03 |
| 65 | | 2.104918E+03 | -4.189662E+03 | -4.131829E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 65 | 7.729548E+03 |
| 66 | | -3.505978E+03 | -3.448031E+03 | -4.385214E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 66 | 6.803326E+02 |
| 67 | | -3.440185E+03 | 1.412210E-06 | -3.528185E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 67 | 3.140370E+03 |
| 68 | | -2.775563E+03 | 2.559235E+03 | -3.332506E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 68 | 6.807218E+02 |
| 69 | | 1.484741E+03 | 3.122028E+03 | -3.130438E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 69 | 7.837075E+03 |
| 70 | | 2.991054E+03 | 8.704444E-04 | -3.629700E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 70 | 1.024061E+03 |
| 71 | | 1.484741E+03 | -3.122028E+03 | -3.130438E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 71 | 7.837076E+03 |
| 72 | | -2.775564E+03 | -2.559234E+03 | -3.332505E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 72 | 6.807183E+02 |
| 73 | | -2.355862E+03 | 1.407725E-06 | -2.374582E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 73 | 3.265702E+03 |
| 74 | | -2.001950E+03 | 1.685957E+03 | -2.297823E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 74 | 6.811368E+02 |
| 75 | | 8.776312E+02 | 2.067644E+03 | -2.107145E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 75 | 7.946888E+03 |
| 76 | | 1.874915E+03 | 5.931863E-04 | -2.540753E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 76 | 1.023578E+03 |
| 77 | | 8.776312E+02 | -2.067644E+03 | -2.107145E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 77 | 7.946888E+03 |
| 78 | | -2.001951E+03 | -1.685957E+03 | -2.297823E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 78 | 6.811335E+02 |
| 79 | | -1.307378E+03 | 1.392821E-06 | -1.188297E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 79 | 3.395156E+03 |
| 80 | | -1.187409E+03 | 8.284756E+02 | -1.281502E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 80 | 6.814697E+02 |
| 81 | | 2.834546E+02 | 1.026491E+03 | -1.062836E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 81 | 8.057177E+03 |
| 82 | | 7.737929E+02 | 3.083340E-04 | -1.436623E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 82 | 1.022470E+03 |
| 83 | | 2.834546E+02 | -1.026491E+03 | -1.062836E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 83 | 8.057177E+03 |
| 84 | | -1.187409E+03 | -8.284755E+02 | -1.281502E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 84 | 6.814634E+02 |
| 85 | 3 | -2.761421E+02 | 1.354219E-06 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 85 | 1.805200E+04 |
| 86 | | -2.979449E+02 | 2.677693E-06 | -2.992121E+02 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | | |

NUMBER OF ITERATIONS 11

NORMAL TERMINATION OF SEADYN

mooring line tens.
elem. 79,81,83

array tension
elem. 80,82,84

FLIP excursion
276 ft. at water lin

## Example Three

array.2.in
.out

Weighted Arrays

This is the same input file as array.1.in except the array weighs 0.200 lbs/ft instead of 0.0001 lbs/ft. All of the input tensions are the same, which would not be the case in the real world, but for simplicity's sake they are. For an explanation of these files, read the array.1.in report with the following changes.

Input File (array.2.in):

The array weight in the NGEN card is changed to 0.200 lbs/ft. The array weight in the MATE card is changed to 0.200 lbs/ft.

Output File (array.2.out):

This is the same shortened form of output as is in array.1.out. The tensions of the arrays at their interface with FLIP are greater in this trial than when the arrays were neutrally buoyant. The tensions for the arrays are about 3,800 lbs in the no current situation, and the excursion of FLIP is about 25 feet down the negative x axis due to incorrect symmetry. When the current is introduced the tension in the array that is bruiting the force, array Beta, has a tension of 4,109 lbs as represented by element 82. The new position of FLIP is -276 ft on the x axis which means that the excursion due to the current is 251 feet down the negative x axis.

array.2.in

```
Test case with the array. $
* excursion of array is now 17439.
* correct current profile installed.
* current in -x direction
* array weight is .2 lb/ft (-1000 lbs per module)
*
*
PROB
86,85,-3,-1
FLUID
,1
NODE                            * Nodes as in ntbk.  1-2-3 anchors.
1,,-17000,0,-12000,3,3,3        * A line anchor
2,,-8720,15103,-12000,3,3,3     * ALPHA array
3,,8500,14722,-12000,3,3,3      * B line anchor
4,,17439,0,-12000,3,3,3         * BETA array
5,,8500,-14722,-12000,3,3,3     * C line anchor
6,,-8720,-15103,-12000,3,3,3    * GAMMA array
7,,-16600,0,-12000              * end of A chain
9,,8300,14376,-12000            * end of B chain
11,,8300,-14376,-12000          * end of C chain
85,,0,0,0,0,0,3                 * FLIP waterline
86,,0,0,-300,0,0,0              * FLIP stern
NGEN
12,7,85,6,0,13,1,.1068,4000     * line A
13,2,86,6,0,8,1,.1068,1300      * array ALPHA
8,32,86,6,0,38,1,.2,1300
12,9,85,6,0,15,1,.1068,4000     * line B
13,4,86,6,0,10,1,.1068,1300     * array BETA
8,34,86,6,0,40,1,.2,1300
12,11,85,6,0,17,1,.1068,4000    * line C
13,6,86,6,0,12,1,.1068,1300     * array GAMMA
8,36,86,6,0,42,1,.2,1300
LIMIT
1,-12000,,,1
LLOC
1,7,30,1
ELEM
1,1,7,,4,0                      * chain
2,2,8,,5,0
3,3,9,,4,0                      * chain
4,4,10,,5,0,0
5,5,11,,4,0,0                   * chain
6,6,12,,5,0,0
7,7,13,,1,0,0
8,8,14,,5,0,0
9,9,15,,1,0,0
10,10,16,,5,0,0
11,11,17,,1,0,0
12,12,18,,5,0,0
13,13,19,,1,0,0
14,14,20,,5,0,0
15,15,21,,1,0,0
16,16,22,,5,0,0
17,17,23,,1,0,0
18,18,24,,5,0,0
19,19,25,,1,0,0
20,20,26,,5,0,0
21,21,27,,1,0,0
22,22,28,,5,0,0
```

weight of array i
0.2 lbs/ft in NGE

```
23,23,29,,1,0,0
24,24,30,,5,0,0
25,25,31,,1,0,0
26,26,32,,5,0,0
27,27,33,,1,0,0
28,28,34,,5,0,0
29,29,35,,1,0,0
30,30,36,,5,0,0
31,31,37,,1,0,0
32,32,38,,2,0,0
33,33,39,,1,0,0
34,34,40,,2,0,0
35,35,41,,1,0,0
36,36,42,,2,0,0
37,37,43,,1,0,0
38,38,44,,2,0,0
39,39,45,,1,0,0
40,40,46,,2,0,0
41,41,47,,1,0,0
42,42,48,,2,0,0
43,43,49,,1,0,0
44,44,50,,2,0,0
45,45,51,,1,0,0
46,46,52,,2,0,0
47,47,53,,1,0,0
48,48,54,,2,0,0
49,49,55,,1,0,0
50,50,56,,2,0,0
51,51,57,,1,0,0
52,52,58,,2,0,0
53,53,59,,1,0,0
54,54,60,,2,0,0
55,55,61,,1,0,0
56,56,62,,2,0,0
57,57,63,,1,0,0
58,58,64,,2,0,0
59,59,65,,1,0,0
60,60,66,,2,0,0
61,61,67,,1,0,0
62,62,68,,2,0,0
63,63,69,,1,0,0
64,64,70,,2,0,0
65,65,71,,1,0,0
66,66,72,,2,0,0
67,67,73,,1,0,0
68,68,74,,2,0,0
69,69,75,,1,0,0
70,70,76,,2,0,0
71,71,77,,1,0,0
72,72,78,,2,0,0
73,73,79,,1,0,0
74,74,80,,2,0,0
75,75,81,,1,0,0
76,76,82,,2,0,0
77,77,83,,1,0,0
78,78,84,,2,0,0
79,79,85,,1,0,0
80,80,86,,2,0,0
81,81,85,,1,0,0
82,82,86,,2,0,0
```

```
83,83,85,,1,0,0
84,84,86,,2,0,0
85,85,86,,3,0,0
TENS
1,79,6,1
2,80,6,2
3,81,6,3
4,82,6,4
5,83,6,5
6,84,6,6
85,85,0,,1000
MATE
1,,.125,.1068W9,2000000,1       * line
2,,.125,.2W9,200000000,1        * array
3,,17.4,110W9,1000000000,1      * FLIP
4,,.125,50W9,1000000000,1       * chain
5,,.125,.1068W9,2000000,1       * hawser
FLOW
1,2,-12000,-.338,0,0,-500,-.338,0,0,0,-1.688,0,0
DEAD
LIVE
   CURR,1,1,0
END
```

[redacted]
__weight of array is
0.2 lbs/ft in M/¯E

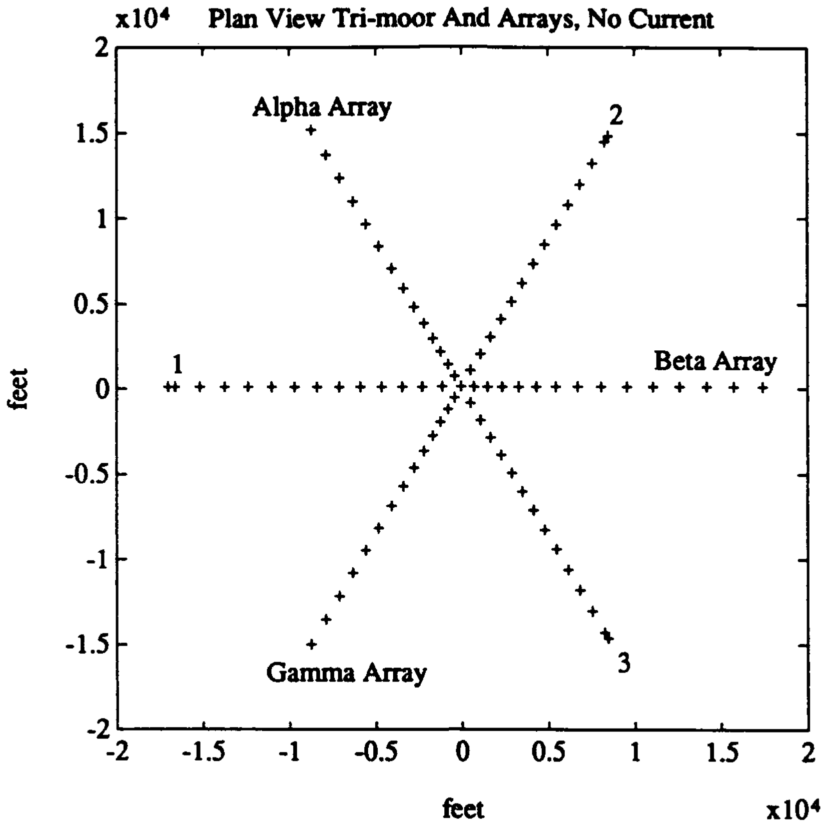

x10⁴ Plan View Tri-moor And Arrays, No Current
Alpha Array
Beta Array
Gamma Array
1
2
3
feet
feet
x10⁴
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2

Figure 7a.

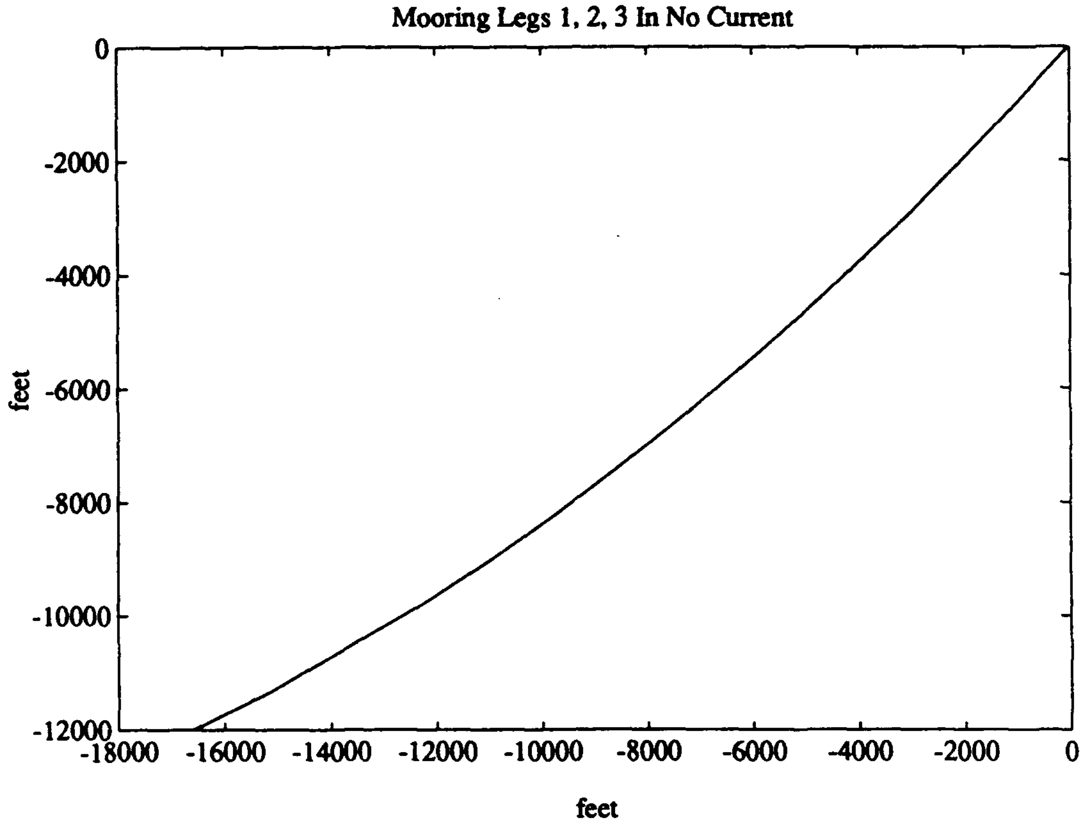

Mooring Legs 1, 2, 3 In No Current
0
-2000
-4000
-6000
-8000
-10000
-12000
feet
-18000
-16000
-14000
-12000
-10000
-8000
-6000
-4000
-2000
0
feet

Figure 7b

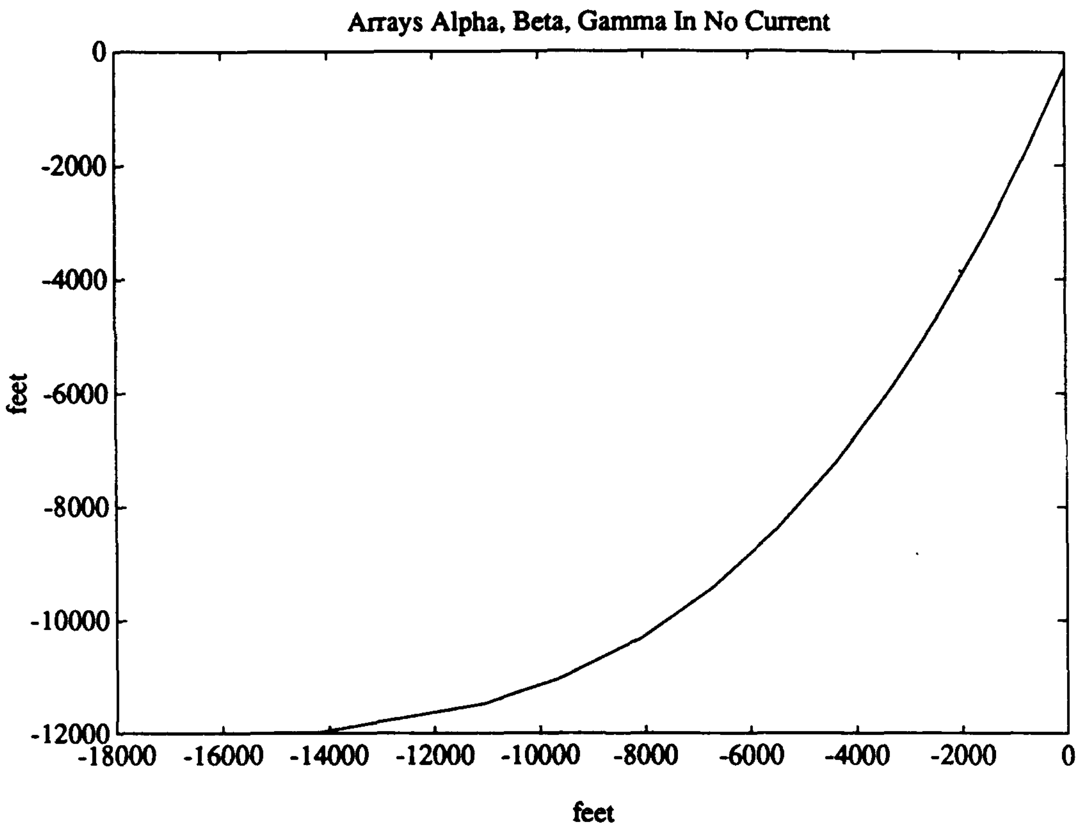
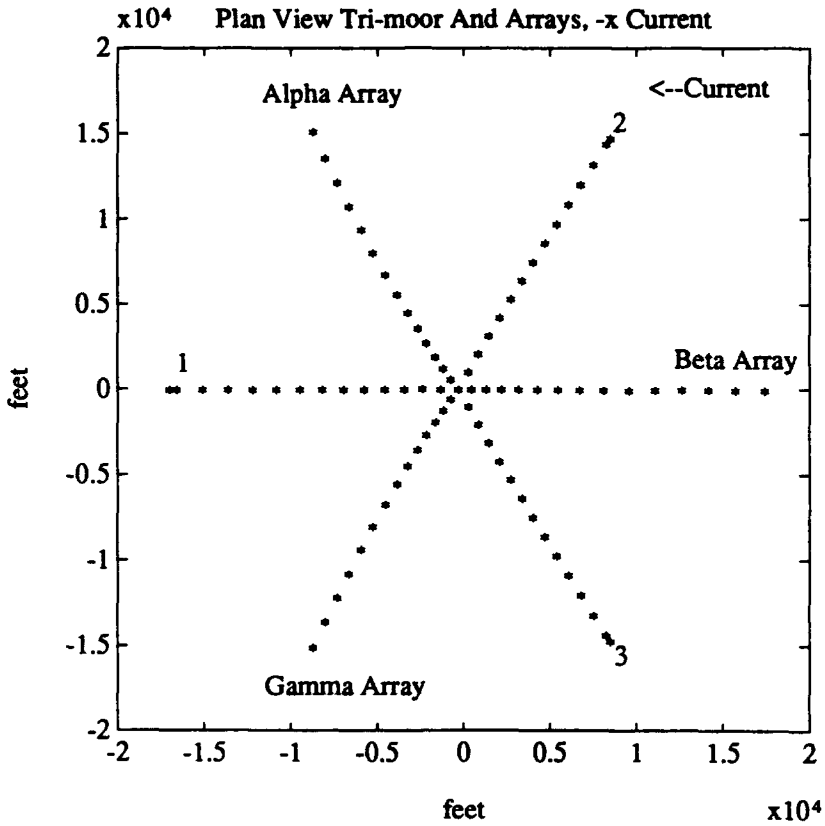



Figure 7b (continued)



x10⁴ Plan View Tri-moor And Arrays, -x Current
Alpha Array
<--Current
Beta Array
Gamma Array
1
2
3
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
feet
feet
x10⁴


Figure 7c

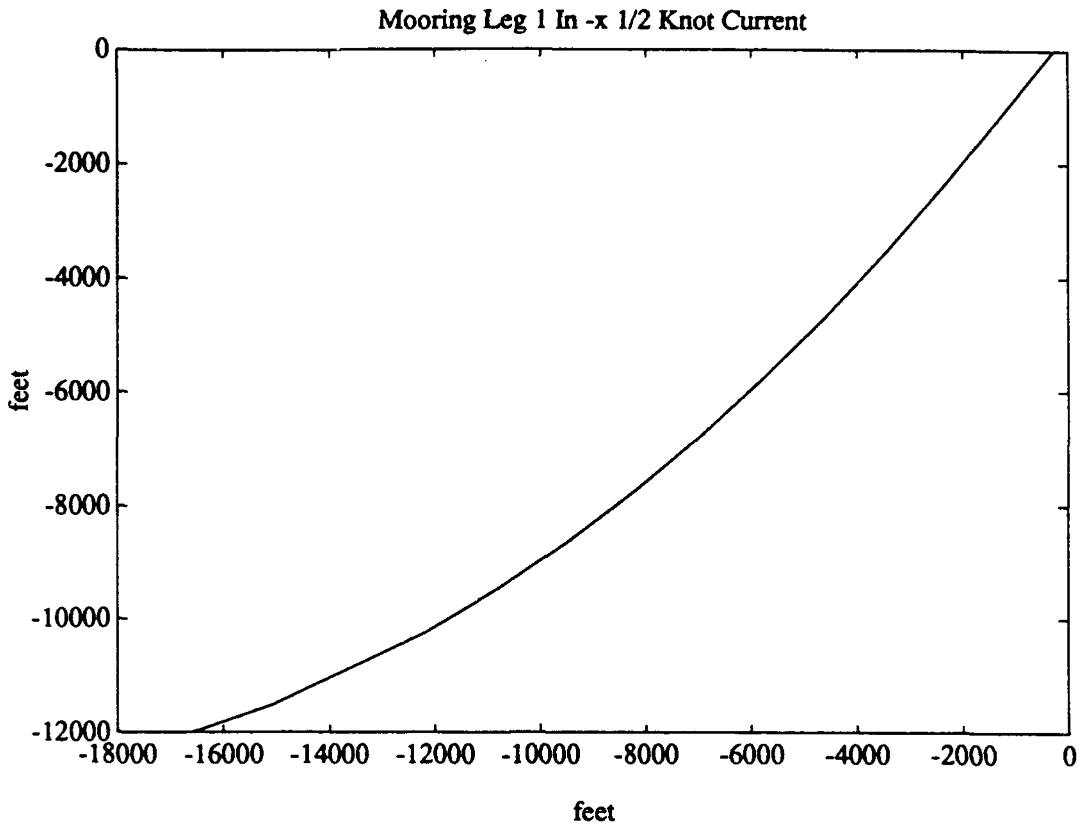

Mooring Leg 1 In -x 1/2 Knot Current
0
-2000
-4000
-6000
-8000
-10000
-12000
feet
-18000
-16000
-14000
-12000
-10000
-8000
-6000
-4000
-2000
0
feet

Figure 7d

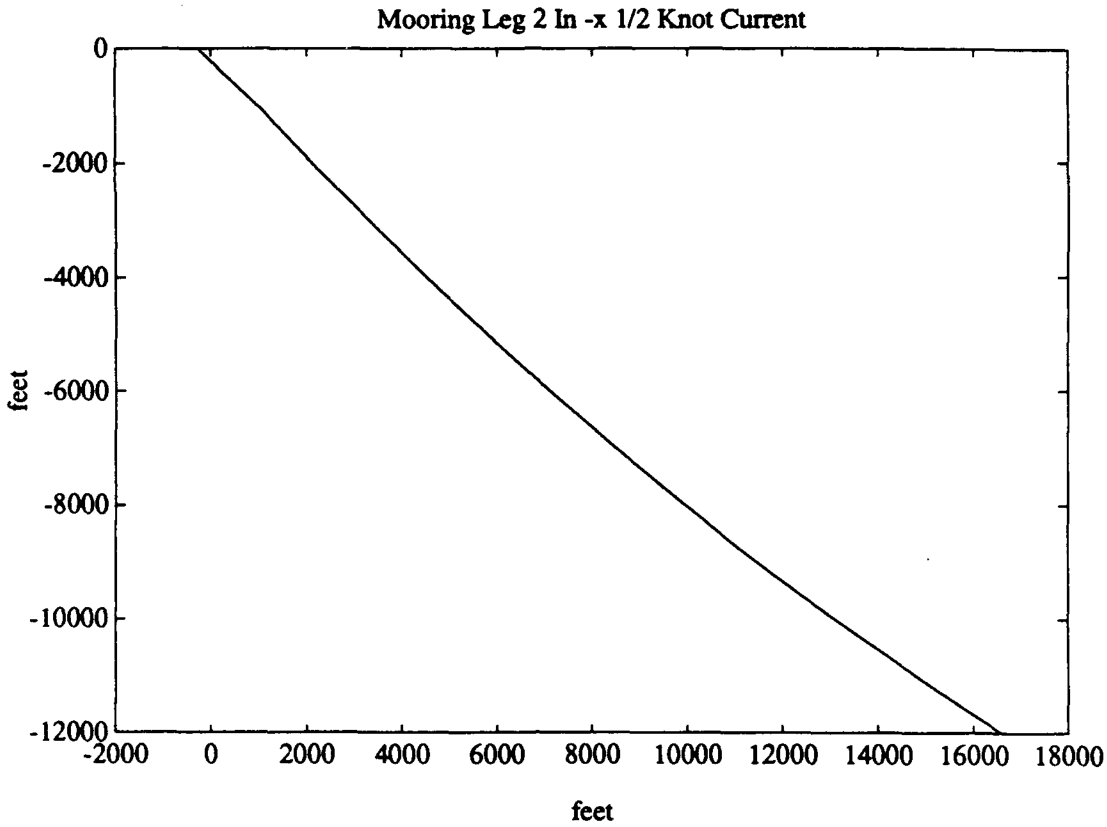



Figure 7d (continued)

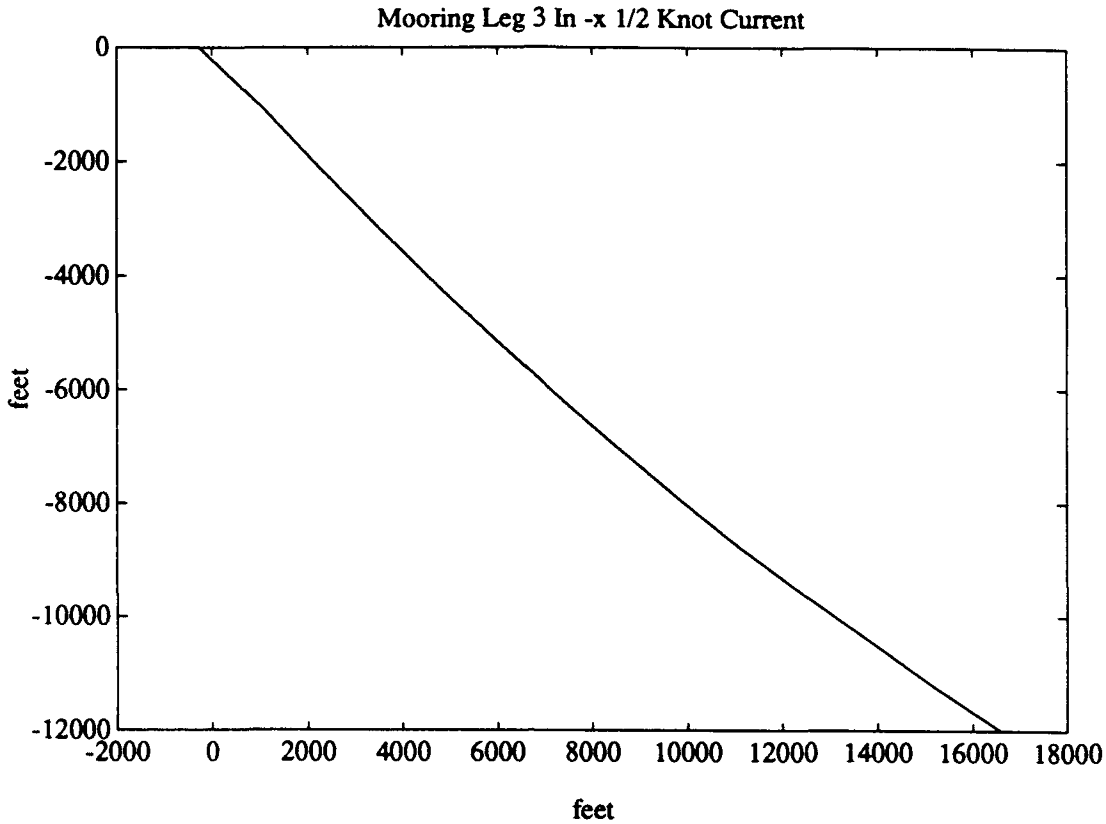

Mooring Leg 3 In -x 1/2 Knot Current
0
-2000
-4000
-6000
-8000
-10000
-12000
feet
-2000
0
2000
4000
6000
8000
10000
12000
14000
16000
18000
feet

Figure 7e

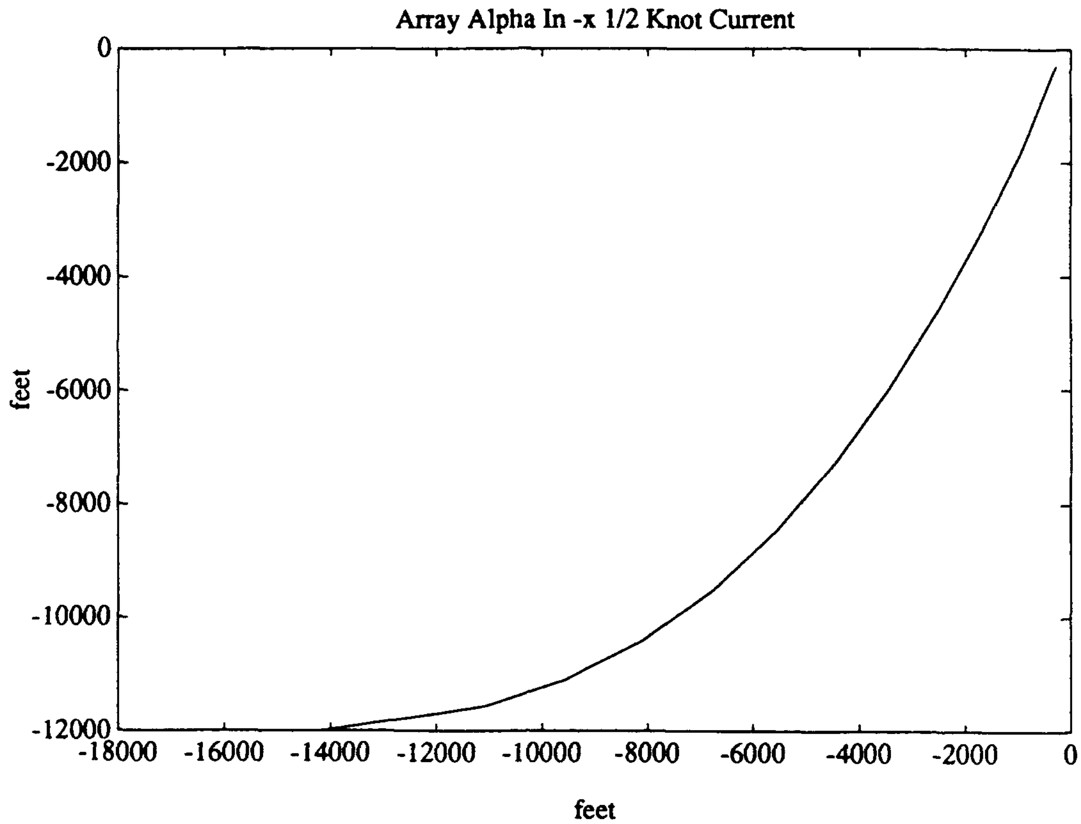



Figure 7e (continued)

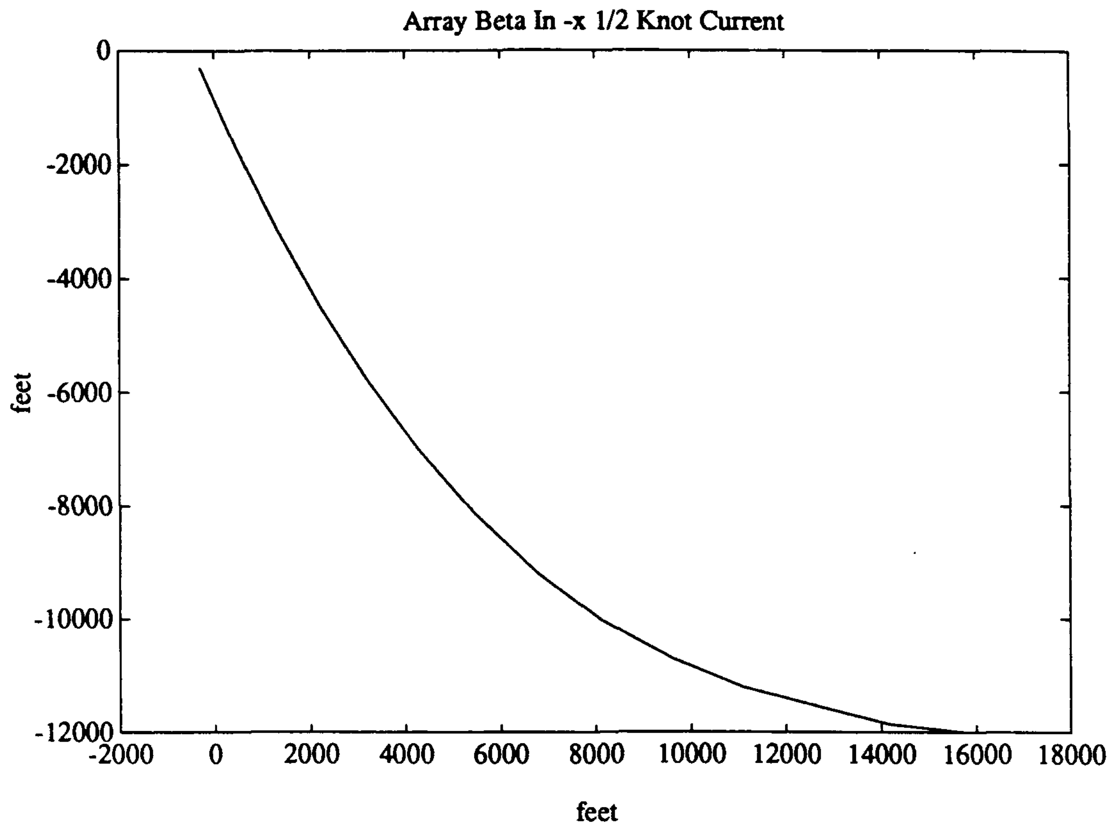

Array Beta In -x 1/2 Knot Current
0
-2000
-4000
-6000
-8000
-10000
-12000
feet
-2000
0
2000
4000
6000
8000
10000
12000
14000
16000
18000
feet

Figure 7f

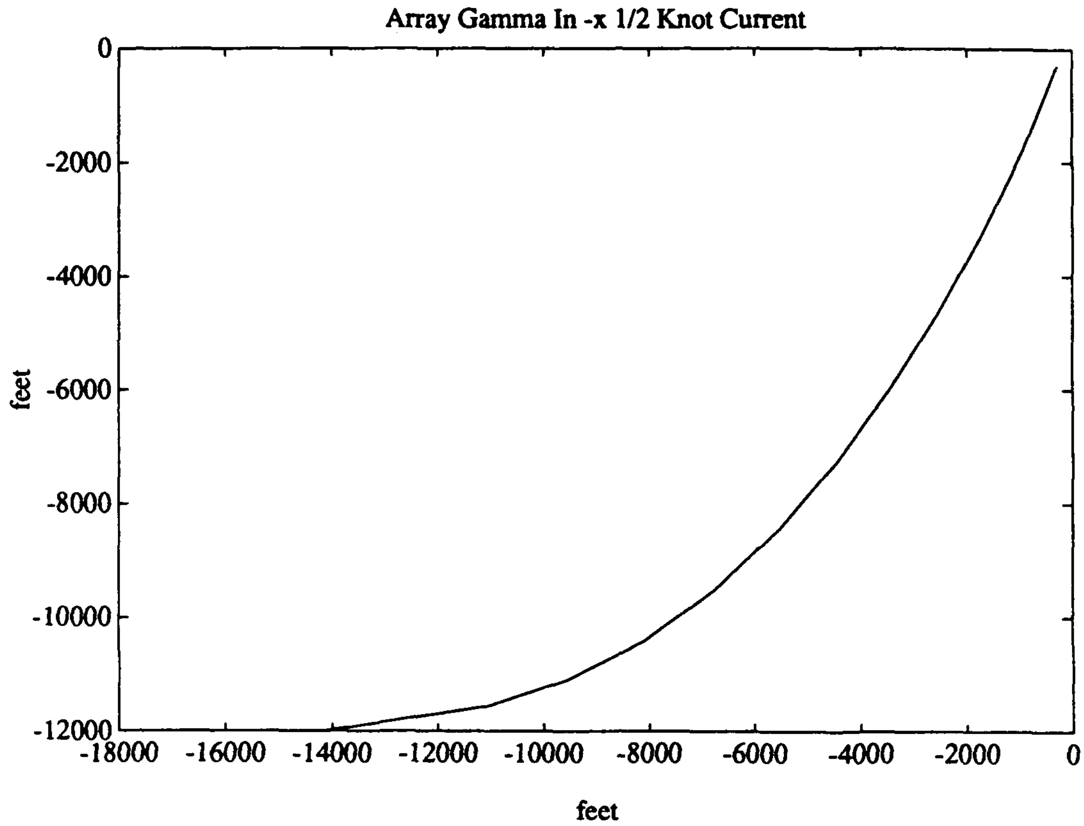



Figure 7f (continued)

array.2.out



```
NONLINEAR CABLE AND MOORING ANALYSIS PROGRAM -- S E A D Y N  9  0        DATE-hour 2.2 *    TIME-/
#
/usr/l
 VERSION   RLW-UNIX-23MAR91  -DP-


 MESSAGE
    DATE
16JUL90     Modified Material Damping Input
03JUL90     Lower case keywords enabled
13JUN90     RESTART FILE HAS BEEN CHANGED
13JUN90     REVISED CURR RECORD INPUT FORMAT
20MAR89     THIS VERSION ALLOWS 250 LIMIT LOCATIONS


 LINE   DIRECT LIST OF INPUT DATA FOR SEADYN

   1    Test case with the array. $
   2    * excursion of array is now 17439.
   3    * correct current profile installed.
   4    * current in -x direction
   5    * array weight is .2 lb/ft (-1000 lbs per module)
   6    *
   7    *
   8    PROB
   9    86,85,-3,-1
  10    FLUID
  11    ,1
  12    NODE                              * Nodes as in ntbk.  1-2-3 anchors.
  13    1,,-17000,0,-12000,3,3,3          * A line anchor
  14    2,,-8720,15103,-12000,3,3,3       * ALPHA array
  15    3,,8500,14722,-12000,3,3,3        * B line anchor
  16    4,,17439,0,-12000,3,3,3           * BETA array
  17    5,,8500,-14722,-12000,3,3,3       * C line anchor
  18    6,,-8720,-15103,-12000,3,3,3      * GAMMA array
  19    7,,-16600,0,-12000                * end of A chain
  20    9,,8300,14376,-12000              * end of B chain
  21    11,,8300,-14376,-12000            * end of C chain
  22    85,,0,0,0,0,0,3                   * FLIP waterline
  23    86,,0,0,-300,0,0,0                * FLIP stern
  24    NGEN
  25    12,7,85,6,0,13,1,.1068,4000       * line A
  26    13,2,86,6,0,8,1,.1068,1300        * array ALPHA
  27    8,32,86,6,0,38,1,.2,1300
  28    12,9,85,6,0,15,1,.1068,4000       * line B
  29    13,4,86,6,0,10,1,.1068,1300       * array BETA
  30    8,34,86,6,0,40,1,.2,1300
  31    12,11,85,6,0,17,1,.1068,4000      * line C
  32    13,6,86,6,0,12,1,.1068,1300       * array GAMMA
  33    8,36,86,6,0,42,1,.2,1300
```

echoing input

```
LIMIT
1,-12000,,,1
LLOC
1,7,30,1
ELEM
1,1,7,,4,0                    * chain
2,2,8,,5,0
3,3,9,,4,0                    * chain
4,4,10,,5,0,0
5,5,11,,4,0,0                 * chain
6,6,12,,5,0,0
7,7,13,,1,0,0
8,8,14,,5,0,0
9,9,15,,1,0,0
10,10,16,,5,0,0
11,11,17,,1,0,0
12,12,18,,5,0,0
13,13,19,,1,0,0
14,14,20,,5,0,0
15,15,21,,1,0,0
16,16,22,,5,0,0
17,17,23,,1,0,0
18,18,24,,5,0,0
19,19,25,,1,0,0
20,20,26,,5,0,0
21,21,27,,1,0,0
22,22,28,,5,0,0
23,23,29,,1,0,0
24,24,30,,5,0,0
25,25,31,,1,0,0
26,26,32,,5,0,0
27,27,33,,1,0,0
28,28,34,,5,0,0
29,29,35,,1,0,0
30,30,36,,5,0,0
31,31,37,,1,0,0
32,32,38,,2,0,0
33,33,39,,1,0,0
34,34,40,,2,0,0
35,35,41,,1,0,0
36,36,42,,2,0,0
37,37,43,,1,0,0
38,38,44,,2,0,0
39,39,45,,1,0,0
40,40,46,,2,0,0
41,41,47,,1,0,0
42,42,48,,2,0,0
43,43,49,,1,0,0
44,44,50,,2,0,0
45,45,51,,1,0,0
46,46,52,,2,0,0
47,47,53,,1,0,0
48,48,54,,2,0,0
49,49,55,,1,0,0
50,50,56,,2,0,0
51,51,57,,1,0,0
```

```
52,52,58,,2,0,0
53,53,59,,1,0,0
54,54,60,,2,0,0
55,55,61,,1,0,0
56,56,62,,2,0,0
57,57,63,,1,0,0
58,58,64,,2,0,0
59,59,65,,1,0,0
60,60,66,,2,0,0
61,61,67,,1,0,0
62,62,68,,2,0,0
63,63,69,,1,0,0
64,64,70,,2,0,0
65,65,71,,1,0,0
66,66,72,,2,0,0
67,67,73,,1,0,0
68,68,74,,2,0,0
69,69,75,,1,0,0
70,70,76,,2,0,0
71,71,77,,1,0,0
72,72,78,,2,0,0
73,73,79,,1,0,0
74,74,80,,2,0,0
75,75,81,,1,0,0
76,76,82,,2,0,0
77,77,83,,1,0,0
78,78,84,,2,0,0
79,79,85,,1,0,0
80,80,86,,2,0,0
81,81,85,,1,0,0
82,82,86,,2,0,0
83,83,85,,1,0,0
84,84,86,,2,0,0
85,85,86,,3,0,0
TENS
1,79,6,1
2,80,6,2
3,81,6,3
4,82,6,4
5,83,6,5
6,84,6,6
85,85,0,,1000
MATE
1,,.125,.1068W9,2000000,1      * line
2,,.125,.2W9,200000000,1       * array
3,,17.4,110W9,1000000000,1     * FLIP
4,,.125,50W9,1000000000,1      * chain
5,,.125,.1068W9,2000000,1      * hawser
FLOW
1,2,-12000,-.338,0,0,-500,-.338,0,0,0,-1.688,0,0
DEAD
LIVE
   CURR,1,1,0
END
```

```
Aug 15 15:59 1991  seadyn.out Page 4

#
/usr/1           PAGE     1
         Test case with the array.

 SEADYN--Test case with the array.                                        hour 2.2 *   /
#
/usr/1   PAGE     2

 N E W   P R O B L E M   D A T A

         NUMBER OF   NODES    =       86
         NUMBER OF ELEMENTS   =       85     NBASE  =     12761
         GRAVITY DIRECTION    =       -3     NIBASE =      1785
         INPUT ECHO FLAG      =       -1
         SHIP LOAD FILE FLAG  =        0

         GRAVITATIONAL ACCELERATION =   0.321740E+02
              MATERIAL DAMPING RATIOS FOR (CA1,EA1)   0.500000E-02   0.000000E+00
              MATERIAL DAMPING RATIOS FOR (CA1,EA1)   0.500000E-02   0.000000E+00
              MATERIAL DAMPING RATIOS FOR (CA1,EA1)   0.500000E-02   0.000000E+00
              MATERIAL DAMPING RATIOS FOR (CA1,EA1)   0.500000E-02   0.000000E+00
              MATERIAL DAMPING RATIOS FOR (CA1,EA1)   0.500000E-02   0.000000E+00

  KEY TO STANDARD OUTPUT FIXITY CODES FOR NODAL DISPLACEMENTS
      CODE    EXPLANTION
        1     FIXED, BUT MAY BE SUBJECT TO SPECIFIED LIMIT SET
        2     FIXED WHILE RESERVED FOR PAYOUT
        3     UNCONDITIONALLY FIXED
        M     DYNAMICALLY MOVED
        H     HELD WITH AN IMPOSED DISPLACEMENT
        S     SLAVE COMPONENT
        B     BUOY HELD AT SURFACE LIMIT
              FREE (UNCONSTRAINED) COMPONENT

 SEADYN--Test case with the array.                                        hour 2.2 *   /
#
/usr/1   PAGE     3

 L O A D   C A S E   P A R A M E T E R S

         SUBANALYSIS TYPE = DEAD

 SEADYN--Test case with the array.                                        hour 2.2 *   /
#
/usr/1   PAGE     4
```

short output form

no current

```
S O L U T I O N   O P T I O N   S U M M A R Y

        ANALYSIS TYPE - DEAD
        SOLUTION FORM - VRR

        NO. OF STATIC STEPS     -    1
        OUTPUT INTERVAL         -    0
        OPTIONAL OUTPUT CODE    -    0
        RESTART FILE FLAG       -    0
        START UP OPTION         -    0
        NO. OF POINT LOADS      -    0
        FLOW FIELD NUMBER       -    0
        VISCOUS RELAXATION SOLUTION PARAMETERS
          INTEGRATION PARAMETER   -    0.10000E+01
          INITIAL STEP SIZE       -    0.10000E+01
          INITIAL DAMPING         -    0.10000E-02
          ITERATION LIMIT         -  150

SEADYN--Test case with the array.                               hour 2.2 *   /
#
/usr/l   PAGE     5

   DEAD LOAD INCREMENT =       1     LOAD FACTOR    0.10000E+01
```

| NODE | FIXITY | | | X | Y | Z | VX | VY | VZ | ELT | TENSION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 3 | 3 | -1.700000E+04 | 0.000000E+00 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 1 | 3.693957E+03 |
| 2 | 3 | 3 | 3 | -8.720000E+03 | 1.510300E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 2 | 1.681140E+03 |
| 3 | 3 | 3 | 3 | 8.500000E+03 | 1.472200E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 3 | 3.649618E+03 |
| 4 | 3 | 3 | 3 | 1.743900E+04 | 0.000000E+00 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 4 | 1.714032E+03 |
| 5 | 3 | 3 | 3 | 8.500000E+03 | -1.472200E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 5 | 3.649618E+03 |
| 6 | 3 | 3 | 3 | -8.720000E+03 | -1.510300E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 6 | 1.681140E+03 |
| 7 | | | 1 | -1.660000E+04 | 2.515804E-15 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 7 | 4.071421E+03 |
| 8 | | | 1 | -7.878841E+03 | 1.364207E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 8 | 1.681291E+03 |
| 9 | | | 1 | 8.299740E+03 | 1.437615E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 9 | 4.014847E+03 |
| 10 | | | 1 | 1.575604E+04 | 9.722268E-15 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 10 | 1.714499E+03 |
| 11 | | | 1 | 8.299740E+03 | -1.437615E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 11 | 4.014847E+03 |
| 12 | | | 1 | -7.878841E+03 | -1.364207E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 12 | 1.681291E+03 |
| 13 | | | | -1.516226E+04 | 1.155846E-14 | -1.133364E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 13 | 4.145275E+03 |
| 14 | | | | -7.091095E+03 | 1.227390E+04 | -1.197889E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 14 | 1.691952E+03 |
| 15 | | | | 7.576856E+03 | 1.312773E+04 | -1.133866E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 15 | 4.088229E+03 |
| 16 | | | | 1.417968E+04 | 1.887771E-14 | -1.196344E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 16 | 1.726614E+03 |
| 17 | | | | 7.576856E+03 | -1.312773E+04 | -1.133866E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 17 | 4.088229E+03 |
| 18 | | | | -7.091095E+03 | -1.227390E+04 | -1.197889E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 18 | 1.691952E+03 |
| 19 | | | | -1.375013E+04 | 2.044004E-14 | -1.061459E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 19 | 4.224592E+03 |
| 20 | | | | -6.308282E+03 | 1.091430E+04 | -1.180068E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 20 | 1.719140E+03 |
| 21 | | | | 6.866928E+03 | 1.190168E+04 | -1.062351E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 21 | 4.167187E+03 |
| 22 | | | | 1.261436E+04 | 2.796551E-14 | -1.177347E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 22 | 1.754852E+03 |
| 23 | | | | 6.866928E+03 | -1.190168E+04 | -1.062351E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 23 | 4.167187E+03 |
| 24 | | | | -6.308282E+03 | -1.091430E+04 | -1.180068E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 24 | 1.719140E+03 |
| 25 | | | | -1.236452E+04 | 2.915489E-14 | -9.845685E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 25 | 4.309067E+03 |
| 26 | | | | -5.537796E+03 | 9.576112E+03 | -1.147052E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 26 | 1.762094E+03 |
| 27 | | | | 6.170432E+03 | 1.069882E+04 | -9.857471E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 27 | 4.251412E+03 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 28 | 1.107418E+04 | 3.690222E-14 | -1.143536E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 28 | 1.798454E+03 |
| 29 | 6.170432E+03 | -1.069882E+04 | -9.857471E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 29 | 4.251412E+03 |
| 30 | -5.537796E+03 | -9.576112E+03 | -1.147052E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 30 | 1.762094E+03 |
| 31 | -1.100606E+04 | 3.769892E-14 | -9.029746E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 31 | 4.398403E+03 |
| 32 | -4.786030E+03 | 8.270435E+03 | -1.099736E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 32 | 1.851224E+03 |
| 33 | 5.487712E+03 | 9.519762E+03 | -9.043440E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 33 | 4.340595E+03 |
| 34 | 9.571323E+03 | 4.561664E-14 | -1.095792E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 34 | 1.891955E+03 |
| 35 | 5.487712E+03 | -9.519762E+03 | -9.043440E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 35 | 4.340595E+03 |
| 36 | -4.786030E+03 | -8.270435E+03 | -1.099736E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 36 | 1.851224E+03 |
| 37 | -9.675189E+03 | 4.606943E-14 | -8.169534E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 37 | 4.492310E+03 |
| 38 | -4.047897E+03 | 6.988438E+03 | -1.031531E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 38 | 2.009588E+03 |
| 39 | 4.818998E+03 | 8.364888E+03 | -8.184259E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 39 | 4.434437E+03 |
| 40 | 8.091871E+03 | 5.441881E-14 | -1.027622E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 40 | 2.046138E+03 |
| 41 | 4.818998E+03 | -8.364888E+03 | -8.184259E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 41 | 4.434437E+03 |
| 42 | -4.047897E+03 | -6.988438E+03 | -1.031531E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 42 | 2.009588E+03 |
| 43 | -8.372136E+03 | 5.426500E-14 | -7.267733E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 43 | 4.590505E+03 |
| 44 | -3.367505E+03 | 5.806725E+03 | -9.422268E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 44 | 2.205187E+03 |
| 45 | 4.164412E+03 | 7.234416E+03 | -7.282691E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 45 | 4.532649E+03 |
| 46 | 6.726442E+03 | 6.283903E-14 | -9.386043E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 46 | 2.240949E+03 |
| 47 | 4.164412E+03 | -7.234416E+03 | -7.282691E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 47 | 4.532649E+03 |
| 48 | -3.367505E+03 | -5.806725E+03 | -9.422268E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 48 | 2.205187E+03 |
| 49 | -7.096954E+03 | 6.228528E-14 | -6.326929E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 49 | 4.692718E+03 |
| 50 | -2.747081E+03 | 4.729165E+03 | -8.366754E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 50 | 2.429102E+03 |
| 51 | 3.523988E+03 | 6.128399E+03 | -6.341396E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 51 | 4.634953E+03 |
| 52 | 5.478942E+03 | 7.071482E-14 | -8.335410E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 52 | 2.463809E+03 |
| 53 | 3.523988E+03 | -6.128399E+03 | -6.341396E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 53 | 4.634953E+03 |
| 54 | -2.747081E+03 | -4.729165E+03 | -8.366754E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 54 | 2.429102E+03 |
| 55 | -5.849544E+03 | 7.013090E-14 | -5.349594E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 55 | 4.798692E+03 |
| 56 | -2.183602E+03 | 3.750509E+03 | -7.188955E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 56 | 2.674247E+03 |
| 57 | 2.897676E+03 | 5.046755E+03 | -5.362918E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 57 | 4.741083E+03 |
| 58 | 4.343784E+03 | 7.763376E-14 | -7.163317E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 58 | 2.707800E+03 |
| 59 | 2.897676E+03 | -5.046755E+03 | -5.362918E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 59 | 4.741083E+03 |
| 60 | -2.183602E+03 | -3.750509E+03 | -7.188955E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 60 | 2.674247E+03 |
| 61 | -4.629678E+03 | 7.780328E-14 | -4.338082E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 61 | 4.908181E+03 |
| 62 | -1.671640E+03 | 2.861328E+03 | -5.919639E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 62 | 2.935310E+03 |
| 63 | 2.285361E+03 | 3.989283E+03 | -4.349679E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 63 | 4.850788E+03 |
| 64 | 3.310637E+03 | 8.378987E-14 | -5.899828E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 64 | 2.967721E+03 |
| 65 | 2.285361E+03 | -3.989283E+03 | -4.349679E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 65 | 4.850788E+03 |
| 66 | -1.671640E+03 | -2.861328E+03 | -5.919639E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 66 | 2.935310E+03 |
| 67 | -3.437021E+03 | 8.530453E-14 | -3.294621E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 67 | 5.020955E+03 |
| 68 | -1.205138E+03 | 2.051101E+03 | -4.581484E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 68 | 3.208403E+03 |
| 69 | 1.686870E+03 | 2.955687E+03 | -3.303966E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 69 | 4.963831E+03 |
| 70 | 2.367830E+03 | 8.933522E-14 | -4.567260E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 70 | 3.239736E+03 |
| 71 | 1.686870E+03 | -2.955687E+03 | -3.303966E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 71 | 4.963831E+03 |
| 72 | -1.205138E+03 | -2.051101E+03 | -4.581484E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 72 | 3.208403E+03 |
| 73 | -2.271149E+03 | 9.263732E-14 | -2.221309E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 73 | 5.136797E+03 |
| 74 | -7.783041E+02 | 1.309771E+03 | -3.190984E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 74 | 3.490701E+03 |
| 75 | 1.101986E+03 | 1.945589E+03 | -2.227935E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 75 | 5.079988E+03 |
| 76 | 1.504106E+03 | 9.437831E-14 | -3.181950E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 76 | 3.521043E+03 |
| 77 | 1.101986E+03 | -1.945589E+03 | -2.227935E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 77 | 5.079988E+03 |
| 78 | -7.783041E+02 | -1.309771E+03 | -3.190984E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 78 | 3.490701E+03 |
| 79 | -1.131567E+03 | 9.980477E-14 | -1.120120E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 79 | 5.255128E+03 |
| 80 | -3.859667E+02 | 6.283549E+02 | -1.760149E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 80 | 3.779921E+03 |
| 81 | 5.304519E+02 | 9.585462E+02 | -1.123611E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 81 | 5.198676E+03 |
| 82 | 7.093462E+02 | 9.900207E-14 | -1.755856E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 82 | 3.809358E+03 |
| 83 | 5.304519E+02 | -9.585462E+02 | -1.123611E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 83 | 5.198676E+03 |

—mooring line ten:
elem. 79,81,83

— array tension
elem. 80,82,84

```
   84          -3.859667E+02  -6.283549E+02  -1.760149E+03  0.000000E+00  0.000000E+00  0.000000E+00      84   3.779921E+03
   85       3  -2.458171E+01   1.067672E-13   0.000000E+00  0.000000E+00  0.000000E+00  0.000000E+00      85   2.716195E+04
   86          -2.418020E+01   1.032662E-13  -3.000076E+02  0.000000E+00  0.000000E+00  0.000000E+00
 NUMBER OF ITERATIONS        8

 SEADYN--Test case with the array.                                       hour 2.2 *   /
#
/usr/1   PAGE     6


 L O A D   C A S E   P A R A M E T E R S

         SUBANALYSIS TYPE - LIVE


         CURRENT FIELD DATA
              NUMBER     FLOW FIELD MULTIPLIER     VARIATION  CODE
                 1             0.100000E+01            0
                 0             0.100000E+01            0
                 0             0.100000E+01            0
                 0             0.100000E+01            0
                 0             0.100000E+01            0

 SEADYN--Test case with the array.                                       hour 2.2 *   /
#
/usr/1   PAGE     7

 S O L U T I O N   O P T I O N   S U M M A R Y

         ANALYSIS TYPE - LIVE
         SOLUTION FORM - VRR


         NO. OF STATIC STEPS   =    1
         OUTPUT INTERVAL       =    0
         OPTIONAL OUTPUT CODE  =    0
         RESTART FILE FLAG     =    0
         START UP OPTION       =    0
         NO. OF POINT LOADS    =    0
         FLOW FIELD NUMBER     =    1
         VISCOUS RELAXATION SOLUTION PARAMETERS
           INTEGRATION PARAMETER   =    0.10000E+01
           INITIAL STEP SIZE       =     0.10000E+01
           INITIAL DAMPING         =     0.10000E-02
           ITERATION LIMIT         =   150

 SEADYN--Test case with the array.                                       hour 2.2 *   /
#
/usr/1   PAGE     8
```

[redacted]
—with current

STEADY STATE INCREMENT = 1 LOAD FACTOR 0.10000E+01

| NODE | FIXITY | | | X | Y | Z | VX | VY | VZ | ELT | TENSION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 3 | 3 | -1.700000E+04 | 0.000000E+00 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 1 | 2.087393E+03 |
| 2 | 3 | 3 | 3 | -8.720000E+03 | 1.510300E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 2 | 1.526767E+03 |
| 3 | 3 | 3 | 3 | 8.500000E+03 | 1.472200E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 3 | 6.042230E+03 |
| 4 | 3 | 3 | 3 | 1.743900E+04 | 0.000000E+00 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 4 | 2.045375E+03 |
| 5 | 3 | 3 | 3 | 8.500000E+03 | -1.472200E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 5 | 6.042230E+03 |
| 6 | 3 | 3 | 3 | -8.720000E+03 | -1.510300E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 6 | 1.526767E+03 |
| 7 | | | 1 | -1.660000E+04 | 2.719717E-15 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 7 | 2.192677E+03 |
| 8 | | | 1 | -7.992805E+03 | 1.358227E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 8 | 1.526767E+03 |
| 9 | | | 1 | 8.287321E+03 | 1.438364E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 9 | 6.878774E+03 |
| 10 | | | | 1.575576E+04 | 2.958569E-14 | -1.199629E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 10 | 2.051907E+03 |
| 11 | | | 1 | 8.287321E+03 | -1.438364E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 11 | 6.878774E+03 |
| 12 | | | 1 | -7.992805E+03 | -1.358227E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 12 | 1.526767E+03 |
| 13 | | | | -1.509218E+04 | 1.296685E-14 | -1.151739E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 13 | 2.250886E+03 |
| 14 | | | 1 | -7.311724E+03 | 1.215797E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 14 | 1.532615E+03 |
| 15 | | | | 7.546739E+03 | 1.320077E+04 | -1.123972E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 15 | 6.961090E+03 |
| 16 | | | | 1.418469E+04 | 5.721643E-14 | -1.185911E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 16 | 2.072167E+03 |
| 17 | | | | 7.546739E+03 | -1.320077E+04 | -1.123972E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 17 | 6.961090E+03 |
| 18 | | | 1 | -7.311724E+03 | -1.215797E+04 | -1.200000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 18 | 1.532615E+03 |
| 19 | | | | -1.362186E+04 | 2.294799E-14 | -1.093039E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 19 | 2.319689E+03 |
| 20 | | | | -6.622486E+03 | 1.074412E+04 | -1.186351E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 20 | 1.556438E+03 |
| 21 | | | | 6.819487E+03 | 1.202990E+04 | -1.044851E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 21 | 7.046647E+03 |
| 22 | | | | 1.262990E+04 | 8.457922E-14 | -1.159493E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 22 | 2.105782E+03 |
| 23 | | | | 6.819487E+03 | -1.202990E+04 | -1.044851E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 23 | 7.046647E+03 |
| 24 | | | | -6.622486E+03 | -1.074412E+04 | -1.186351E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 24 | 1.556438E+03 |
| 25 | | | | -1.219325E+04 | 3.263226E-14 | -1.024815E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 25 | 2.398093E+03 |
| 26 | | | | -5.922725E+03 | 9.361707E+03 | -1.155974E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 26 | 1.597556E+03 |
| 27 | | | | 6.105644E+03 | 1.087134E+04 | -9.627427E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 27 | 7.135332E+03 |
| 28 | | | | 1.110092E+04 | 1.115122E-13 | -1.120821E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 28 | 2.152195E+03 |
| 29 | | | | 6.105644E+03 | -1.087134E+04 | -9.627427E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 29 | 7.135332E+03 |
| 30 | | | | -5.922725E+03 | -9.361707E+03 | -1.155974E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 30 | 1.597556E+03 |
| 31 | | | | -1.080896E+04 | 4.199984E-14 | -9.479949E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 31 | 2.485116E+03 |
| 32 | | | | -5.220564E+03 | 8.024212E+03 | -1.109986E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 32 | 1.689884E+03 |
| 33 | | | | 5.405262E+03 | 9.725340E+03 | -8.777540E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 33 | 7.227032E+03 |
| 34 | | | | 9.606152E+03 | 1.378804E-13 | -1.070513E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 34 | 2.242583E+03 |
| 35 | | | | 5.405262E+03 | -9.725340E+03 | -8.777540E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 35 | 7.227032E+03 |
| 36 | | | | -5.220564E+03 | -8.024212E+03 | -1.109986E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 36 | 1.689884E+03 |
| 37 | | | | -9.470237E+03 | 5.104056E-14 | -8.634843E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 37 | 2.579818E+03 |
| 38 | | | | -4.513912E+03 | 6.725833E+03 | -1.041546E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 38 | 1.847792E+03 |
| 39 | | | | 4.718357E+03 | 8.592099E+03 | -7.899890E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 39 | 7.321636E+03 |
| 40 | | | | 8.126171E+03 | 1.591675E-13 | -1.002458E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 40 | 2.396851E+03 |
| 41 | | | | 4.718357E+03 | -8.592099E+03 | -7.899890E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 41 | 7.321636E+03 |
| 42 | | | | -4.513912E+03 | -6.725833E+03 | -1.041546E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 42 | 1.847792E+03 |
| 43 | | | | -8.177210E+03 | 5.975245E-14 | -7.721339E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 43 | 2.681330E+03 |
| 44 | | | | -3.848839E+03 | 5.546972E+03 | -9.507247E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 44 | 2.046756E+03 |
| 45 | | | | 4.044921E+03 | 7.471790E+03 | -6.995508E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 45 | 7.419035E+03 |
| 46 | | | | 6.743150E+03 | 1.837693E-13 | -9.161984E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 46 | 2.583431E+03 |
| 47 | | | | 4.044921E+03 | -7.471790E+03 | -6.995508E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 47 | 7.419035E+03 |
| 48 | | | | -3.848839E+03 | -5.546972E+03 | -9.507247E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 48 | 2.046756E+03 |
| 49 | | | | -6.929179E+03 | 6.813974E-14 | -6.747250E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 49 | 2.788860E+03 |
| 50 | | | | -3.229952E+03 | 4.488057E+03 | -8.432144E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 50 | 2.274315E+03 |
| 51 | | | | 3.384917E+03 | 6.364542E+03 | -6.065406E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 51 | 7.519121E+03 |
| 52 | | | | 5.463495E+03 | 2.059073E-13 | -8.150759E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 52 | 2.799797E+03 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 53 | | 3.384917E+03 | -6.364542E+03 | -6.065406E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 53 | 7.519121E+03 |
| 54 | | -3.229952E+03 | -4.488057E+03 | -8.432144E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 54 | 2.274315E+03 |
| 55 | | -5.724840E+03 | 7.621119E-14 | -5.719619E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 55 | 2.901704E+03 |
| 56 | | -2.655812E+03 | 3.539253E+03 | -7.235225E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 56 | 2.523001E+03 |
| 57 | | 2.738285E+03 | 5.270451E+03 | -5.110573E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 57 | 7.621790E+03 |
| 58 | | 4.286370E+03 | 2.244019E-13 | -7.020816E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 58 | 3.036362E+03 |
| 59 | | 2.738285E+03 | -5.270451E+03 | -5.110573E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 59 | 7.621790E+03 |
| 60 | | -2.655812E+03 | -3.539253E+03 | -7.235225E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 60 | 2.523001E+03 |
| 61 | | -4.562487E+03 | 8.397854E-14 | -4.644712E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 61 | 3.019234E+03 |
| 62 | | -2.122289E+03 | 2.687117E+03 | -5.949486E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 62 | 2.795884E+03 |
| 63 | | 2.104944E+03 | 4.189579E+03 | -4.131977E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 63 | 7.726940E+03 |
| 64 | | 3.206434E+03 | 2.384038E-13 | -5.797074E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 64 | 3.284141E+03 |
| 65 | | 2.104944E+03 | -4.189579E+03 | -4.131977E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 65 | 7.726940E+03 |
| 66 | | -2.122289E+03 | -2.687117E+03 | -5.949486E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 66 | 2.795884E+03 |
| 67 | | -3.440166E+03 | 9.145542E-14 | -3.528058E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 67 | 3.140903E+03 |
| 68 | | -1.624519E+03 | 1.918138E+03 | -4.598322E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 68 | 3.076737E+03 |
| 69 | | 1.484793E+03 | 3.121959E+03 | -3.130558E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 69 | 7.834471E+03 |
| 70 | | 2.216089E+03 | 2.539305E-13 | -4.499442E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 70 | 3.549485E+03 |
| 71 | | 1.484793E+03 | -3.121959E+03 | -3.130558E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 71 | 7.834471E+03 |
| 72 | | -1.624519E+03 | -1.918138E+03 | -4.598322E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 72 | 3.076737E+03 |
| 73 | | -2.355799E+03 | 9.865642E-14 | -2.374497E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 73 | 3.266229E+03 |
| 74 | | -1.157761E+03 | 1.220234E+03 | -3.198212E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 74 | 3.351013E+03 |
| 75 | | 8.777133E+02 | 2.067594E+03 | -2.107231E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 75 | 7.944288E+03 |
| 76 | | 1.307045E+03 | 2.698378E-13 | -3.143436E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 76 | 3.825321E+03 |
| 77 | | 8.777133E+02 | -2.067594E+03 | -2.107231E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 77 | 7.944288E+03 |
| 78 | | -1.157761E+03 | -1.220234E+03 | -3.198212E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 78 | 3.351013E+03 |
| 79 | | -1.307265E+03 | 1.055965E-13 | -1.188256E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 79 | 3.395679E+03 |
| 80 | | -7.178337E+02 | 5.830723E+02 | -1.760842E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 80 | 3.636988E+03 |
| 81 | | 2.835712E+02 | 1.026464E+03 | -1.062883E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 81 | 8.054581E+03 |
| 82 | | 4.711339E+02 | 2.845620E-13 | -1.741065E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 82 | 4.108875E+03 |
| 83 | | 2.835712E+02 | -1.026464E+03 | -1.062883E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 83 | 8.054581E+03 |
| 84 | | -7.178337E+02 | -5.830723E+02 | -1.760842E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 84 | 3.636988E+03 |
| 85 | 3 | -2.759807E+02 | 1.123739E-13 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 85 | 2.711150E+04 |
| 86 | | -2.903918E+02 | 2.955457E-13 | -2.996615E+02 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | | |

NUMBER OF ITERATIONS 5

NORMAL TERMINATION OF SEADYN

—mooring line tens
elem. 79,81,83

—array tension
elem. 80,82,84

—FLIP excursion
276 ft at water line

## Neutrally Buoyant Array
## vs.
## Weighted Array

This is a comparison of the array.1 (example 2) and array.2 (example 3) files. The files are identical except for the array weight. The array.1 file has three arrays that weigh 0.0001 lbs/ft which is neutrally buoyant for all practical purposes. The array.2 file has three arrays that weigh 0.200 lbs/ft which is equivalent to -1000 lbs per array module. This weighted array only requires 500 lbs of buoyancy per module while the neutrally buoyant example requires 1500 lbs of buoyancy per module. Both problems use the current profile which is presented in figure 3. The initial tensions are also identical in both problems which means that any changes are due solely to gravity.

The difference between the two files in the no current situation is best represented by the tensions at the interface between the arrays and FLIP. These tensions for array.1 are between 652 lbs and 679 lbs per array. These tensions for array.2 are between 3,779 lbs and 3,809 lbs per array. So the difference between the two files in the no current situation is that of about 3,120 lbs. This is the tension in each array leg at the angle that the array connects to FLIP and is due solely to gravity acting on the weighted array. The tension at the array anchors in the no current situation with the neutrally buoyant arrays is between 461 lbs and 483 lbs. The tension at the array anchors of the weighted arrays is between 1,681 lbs and 1,714 lbs. This is the tension at the angle that the array makes with the sea floor. The difference due to gravity is about 1,230 lbs at the anchor. The excursion of FLIP in each example is about 25 ft with no current. There is about a 1 ft decrease with the weighted array, and FLIP's stern is tilted towards zero. This means that the discrepancy that causes the excursion must be due to poor mooring line geometry. The arrays are trying to correct for this. The same model without any arrays would probably have an even greater excursion in the no current situation.

The array that is bruiting the force of the current is array Beta. The reason that it is taking the most strain is that it is directly upstream. In array.1, it has a tension of 1,022 lbs at the FLIP interface. When the array is weighted (array.2), the tension in this array leg is increased by 3,087 lbs to 4,109 lbs. The other two array legs in the neutrally buoyant example have tensions of 681 lbs each at the FLIP interface. These arrays, in the weighted example, have tensions of 3,637 lbs at this interface,which is 2,956 lbs greater. The excursion of FLIP's water line in array.1 and array.2 is 276 ft. The excursion of FLIP's stern in array.1 is 298 ft because the drag on the downstream arrays makes the stern, where they are attached, move in the direction of the current beyond where the mooring lines are holding her. The same thing happens in the weighted array example. The excursion of FLIP's stern is 290 ft here however, because the weight in the arrays makes them less influenced by the current.

The graphs that are included with each output file show the array legs in both the no current, and the current situations. The neutrally buoyant arrays in the no current scenario are straight lines between FLIP and the 7,500 ft of 2 in 1 nylon that connects the arrays to their anchors. This makes sense because there is no sag due to gravity. The weighted arrays in the no current situation do have sag. The graphs are orthogonal projections of the legs, and that is why they are identical for the no current situation. They are not actually equal because of the incorrect symmetry in the mooring legs, but the discrepancy would not show up on these graphs, so only one graph per file is included in the no current situation. When the current is introduced the upstream array leg in array.1 straightens out some and pulls the intersection between the nylon and the array to a higher altitude. The other two legs in this example gain some slack because they are down stream and they bow with the current. The intersection between the nylon and the array in these legs also gains some altitude, but for different reasons than the upstream leg. The downstream joints are pushed up because the current pushes up on the array legs, while the upstream joint is pulled up by the entire system pulling horizontally on it.

The graph of the array legs in the no current situation of the weighted example (array.2) have an exaggerated sag due to gravity. This catenary is deeper than the catenary of the mooring lines because the arrays now weigh more than the mooring lines. The mooring lines weigh 0.1068 lbs/ft, and in this case the arrays weigh 0.200 lbs/ft. The only reason that the arrays are not the principle component keeping FLIP in place is that the mooring lines have a stronger initial tension, that is to say that they are made tighter than the arrays in the no current situation. This is something that can be done on board FLIP at the FLIP/mooring line interface. The upstream weighted array leg (Beta) has less of a catenary than it did in the no current situation because it is being straightened out by the pulling of the current on the whole system. The other two array legs in this example have a deeper catenary than they did in the no current situation because they have some slack, but do not bow out. This is because the force of gravity outweighs the drag caused by the current in this scenario. The differences in these graphs illustrates what the numbers in the array.1 and array.2 output files are saying. Arrays that have weight (are negatively buoyant) have much more tension in their legs, but they are also much more stable. If they have weight they will not get "blown" around as much by the current, therefor it is advisable to have them weighted for a stable working platform.

The operating parameters for the array state that it can withstand a working load of 4,000 lbs. When the arrays are neutrally buoyant, the loads fall way short of this parameter, but are not stable. When the array weighs 0.200 lbs/ft, which is equivalent to having 500 lbs buoyancy per array module, the loads are right at

4,000 lbs. These loads are assuming the current performs as the profile predicts, should the current pick up, the loads in these 0.200 lbs/ft arrays will quickly rise above the 4,000 lbs mark. To keep within the safety region, a buoyancy between 500 lbs to 750 lbs per module should be employed. It must be kept in mind however, that with every pound of buoyancy that is gained, some stability is lost. As the time for deployment approaches, and more of the operating parameters are learned, some Seadyn models should be run to help decide what amount of buoyancy to use. It is easy enough to manipulate these input files to accommodate differently weighted arrays. The only input cards that need to be changed are the NGEN and the MATE cards. The big question at hand is the depth. The deeper the deployment, the more modules needed, and therefor more drag and weight will be encountered. Any deeper than this depth of 12,000 ft and the 0.200 lbs/ft arrays will weigh too much. They will exceed the 4,000 lbs work load parameter. It is therefor safe to say that the operating depth of the 0.200 lbs/ft arrays is 12,000 ft. There is a later example in 15,000 ft of water where the arrays weigh 0.200 lbs/ft and weigh far too much. A 0.150 lbs/ft weight, which is equivalent to -750 lbs per 1,500 meter (5,000 ft approx.) module, would probably work well. This means that each module would have 750 lbs of buoyancy. This problem is an example of what the array parameters would have to be to accommodate a 15,000 ft depth. All of the data is in example four and should be used as a guide for manipulating input files to handle deeper problems.

[redacted]

array.3.in

```
Test case with the array. $
* correct current profile installed.
* current in - x direction
* array weight is .2 lb/ft
*
*
PROB
104,103,-3,-1
FLUID
,1
NODE                              * Nodes as in ntbk.  1-2-3 anchors.
1,,-21250,0,-15000,3,3,3
2,,-10900,18879,-15000,3,3,3      * ALPHA array
3,,10625,18403,-15000,3,3,3       * B line anchor
4,,21800,0,-15000,3,3,3           * BETA array
5,,10625,-18403,-15000,3,3,3      * C line anchor
6,,-10900,-18879,-15000,3,3,3     * GAMMA array
7,,-20850,0,-15000                * end of A chain
9,,10425,18057,-15000             * end of B chain
11,,10425,-18057,-15000           * end of C chain
103,,0,0,0,0,0,3                  * FLIP waterline
104,,0,0,-300,0,0,0               * FLIP stern
NGEN
15,7,103,6,0,13,1,.1068,5000      * line A
16,2,104,6,0,8,1,.1068,2300       * array ALPHA
11,32,104,6,0,38,1,.2,2300
15,9,103,6,0,15,1,.1068,5000      * line B
16,4,104,6,0,10,1,.1068,2300      * array BETA
11,34,104,6,0,40,1,.2,2300
15,11,103,6,0,17,1,.1068,5000     * line C
16,6,104,6,0,12,1,.1068,2300      * array GAMMA
11,36,104,6,0,42,1,.2,2300
LIMIT
1,-15000,,,1
LLOC
1,7,30,1
ELEM
1,1,7,,4,0                       * chain
2,2,8,,5,0
3,3,9,,4,0                       * chain
4,4,10,,5,0,0
5,5,11,,4,0,0                    * chain
6,6,12,,5,0,0
7,7,13,,1,0,0
8,8,14,,5,0,0
9,9,15,,1,0,0
10,10,16,,5,0,0
11,11,17,,1,0,0
12,12,18,,5,0,0
13,13,19,,1,0,0
14,14,20,,5,0,0
15,15,21,,1,0,0
16,16,22,,5,0,0
17,17,23,,1,0,0
18,18,24,,5,0,0
19,19,25,,1,0,0
20,20,26,,5,0,0
21,21,27,,1,0,0
22,22,28,,5,0,0
23,23,29,,1,0,0
```

[redacted]

104 nodes
103 elements

[redacted]

new anchor points

[redacted]

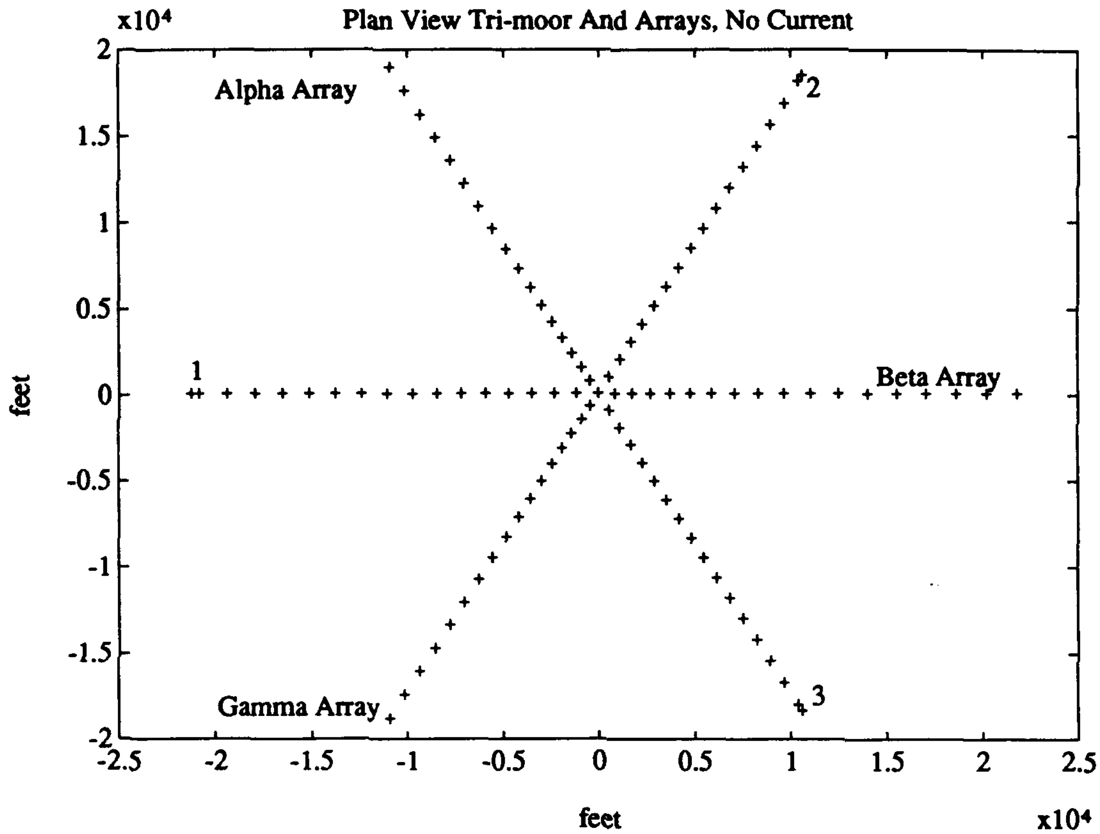
array weight is
0.2 lbs/ft in NGEN

[redacted]

new depth
-15,000 ft

```
24,24,30,,5,0,0
25,25,31,,1,0,0
26,26,32,,5,0,0
27,27,33,,1,0,0
28,28,34,,5,0,0
29,29,35,,1,0,0
30,30,36,,5,0,0
31,31,37,,1,0,0
32,32,38,,2,0,0
33,33,39,,1,0,0
34,34,40,,2,0,0
35,35,41,,1,0,0
36,36,42,,2,0,0
37,37,43,,1,0,0
38,38,44,,2,0,0
39,39,45,,1,0,0
40,40,46,,2,0,0
41,41,47,,1,0,0
42,42,48,,2,0,0
43,43,49,,1,0,0
44,44,50,,2,0,0
45,45,51,,1,0,0
46,46,52,,2,0,0
47,47,53,,1,0,0
48,48,54,,2,0,0
49,49,55,,1,0,0
50,50,56,,2,0,0
51,51,57,,1,0,0
52,52,58,,2,0,0
53,53,59,,1,0,0
54,54,60,,2,0,0
55,55,61,,1,0,0
56,56,62,,2,0,0
57,57,63,,1,0,0
58,58,64,,2,0,0
59,59,65,,1,0,0
60,60,66,,2,0,0
61,61,67,,1,0,0
62,62,68,,2,0,0
63,63,69,,1,0,0
64,64,70,,2,0,0
65,65,71,,1,0,0
66,66,72,,2,0,0
67,67,73,,1,0,0
68,68,74,,2,0,0
69,69,75,,1,0,0
70,70,76,,2,0,0
71,71,77,,1,0,0
72,72,78,,2,0,0
73,73,79,,1,0,0
74,74,80,,2,0,0
75,75,81,,1,0,0
76,76,82,,2,0,0
77,77,83,,1,0,0
78,78,84,,2,0,0
79,79,85,,1,0,0
80,80,86,,2,0,0
81,81,87,,1,0,0
82,82,88,,2,0,0
83,83,89,,1,0,0
```

```
84,84,90,,2,0,0
85,85,91,,1,0,0
86,86,92,,2,0,0
87,87,93,,1,0,0
88,88,94,,2,0,0
89,89,95,,1,0,0
90,90,96,,2,0,0
91,91,97,,1,0,0
92,92,98,,2,0,0
93,93,99,,1,0,0
94,94,100,,2,0,0
95,95,101,,1,0,0
96,96,102,,2,0,0
97,97,103,,1,0,0
98,98,104,,2,0,0
99,99,103,,1,0,0
100,100,104,,2,0,0                                        [redacted]
101,101,103,,1,0,0
102,102,104,,2,0,0                                        ——FLIP element 103
103,103,104,,3,0,0
TENS
1,97,6,1
2,98,6,2
3,99,6,3
4,100,6,4
5,101,6,5
6,102,6,6
103,103,0,,1000
MATE
1,,.125,.1068W9,2000000,1        * line
2,,.125,.2W9,200000000,1         * array
3,,17.4,110W9,1000000000,1       * FLIP
4,,.125,50W9,1000000000,1        * chain
5,,.125,.1068W9,2000000,1        * hawser
FLOW
1,2,-12000,-.338,0,0,-500,-.338,0,0,0,-1.688,0,0
DEAD
LIVE
   CURR,1,1,0
END
```



x10⁴
Plan View Tri-moor And Arrays, No Current
Alpha Array
2
1
Beta Array
Gamma Array
3
feet
feet
x10⁴
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5


Figure 8a

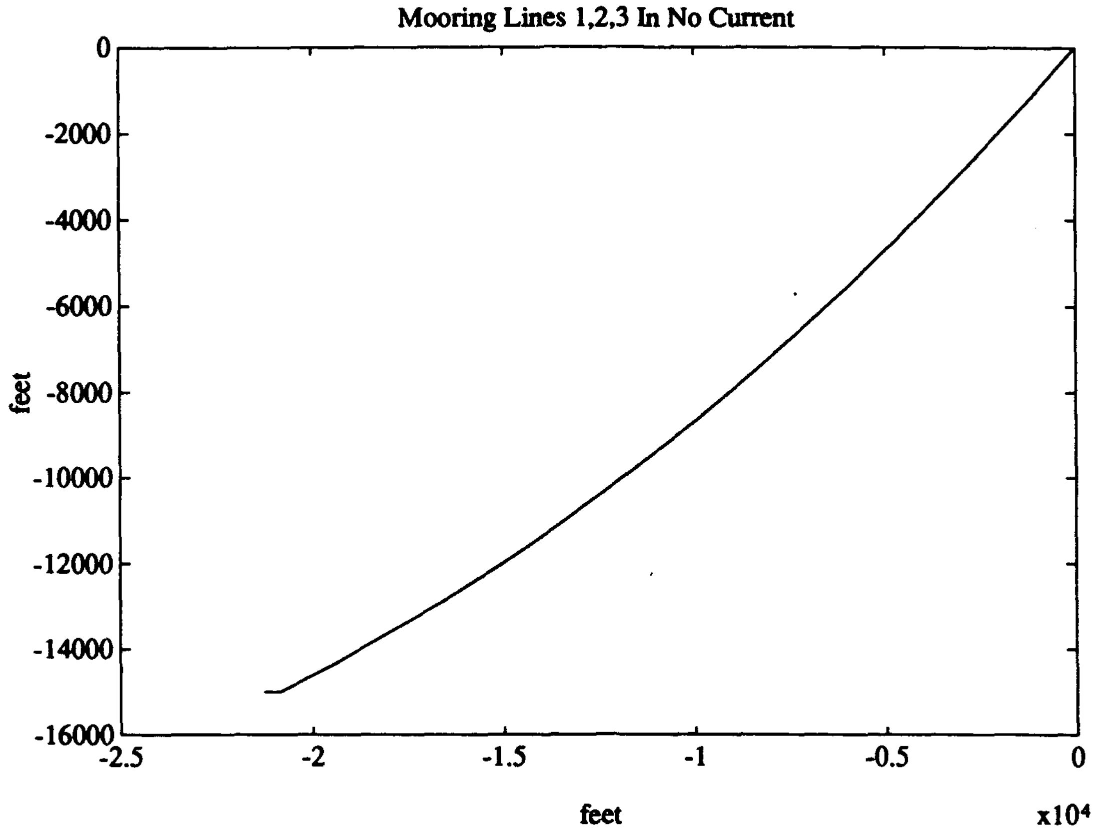

Mooring Lines 1,2,3 In No Current
0
-2000
-4000
-6000
-8000
-10000
-12000
-14000
-16000
feet
-2.5
-2
-1.5
-1
-0.5
0
feet
x10^4

Figure 8b

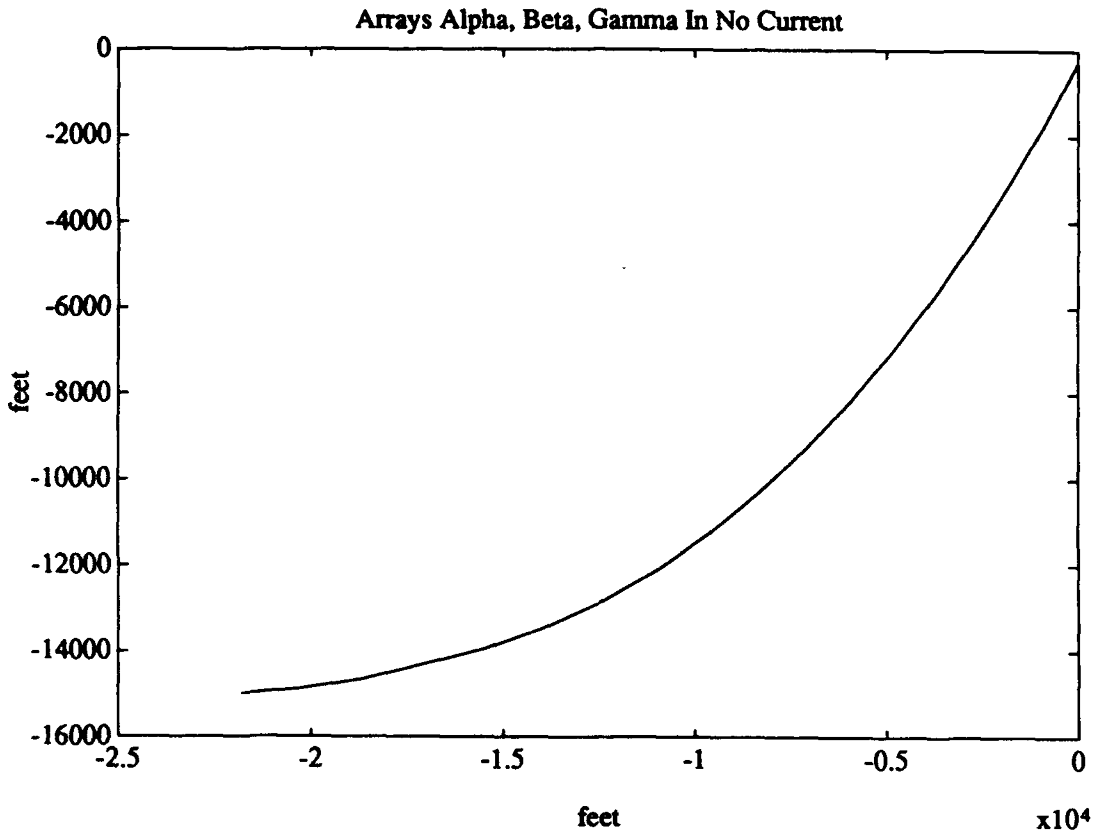



Figure 8b (continued

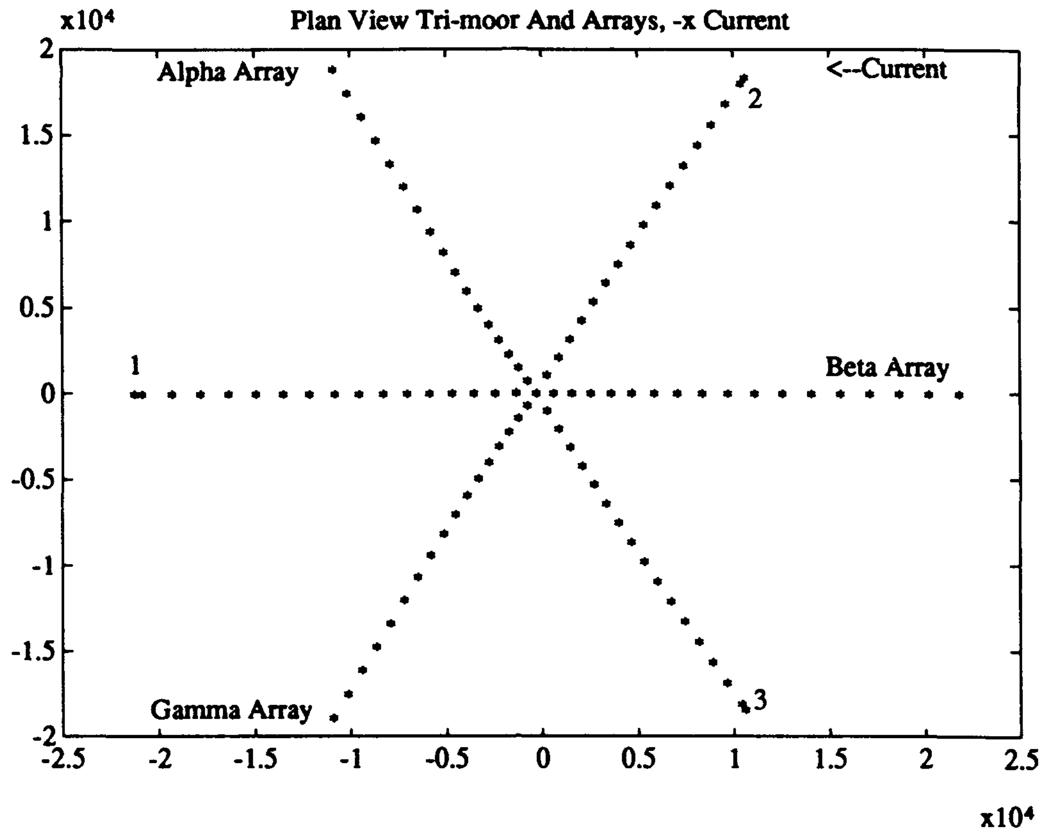

x10⁴
Plan View Tri-moor And Arrays, -x Current
Alpha Array
<--Current
2
1
Beta Array
3
Gamma Array
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
x10⁴

Figure 8c

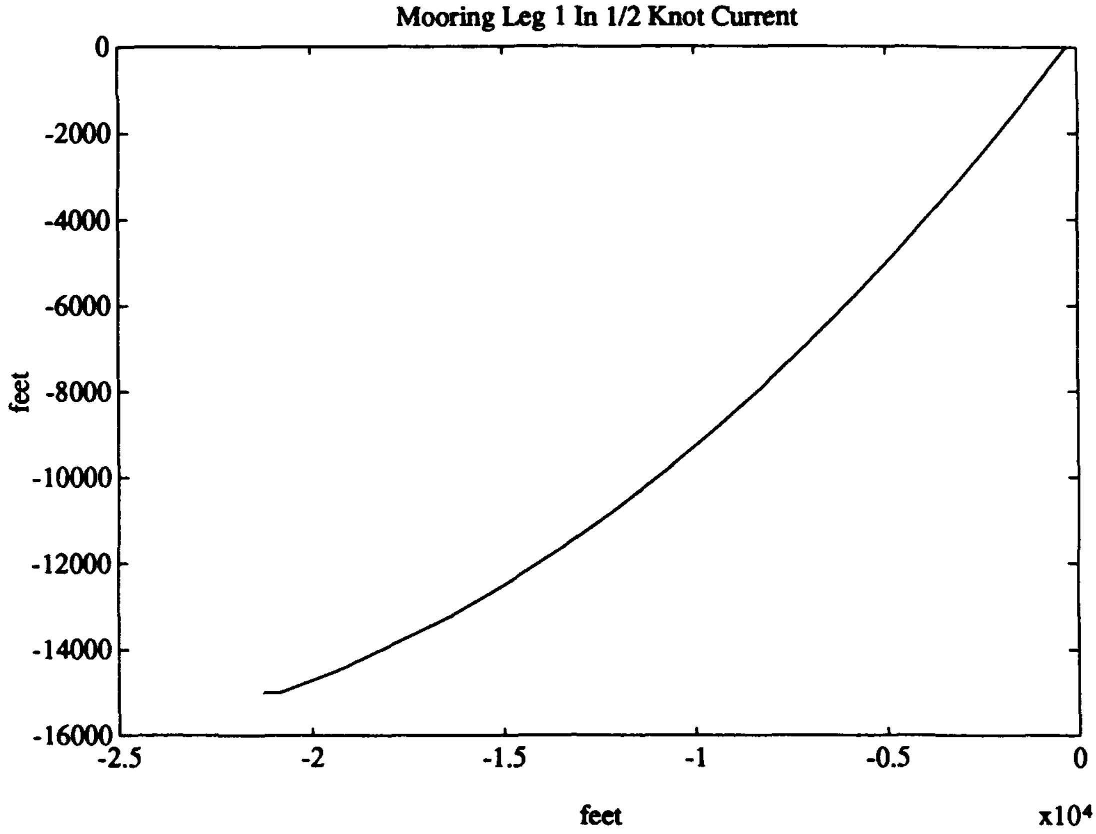

Mooring Leg 1 In 1/2 Knot Current
0
-2000
-4000
-6000
-8000
-10000
-12000
-14000
-16000
feet
-2.5
-2
-1.5
-1
-0.5
0
feet
x10^4

Figure 8d

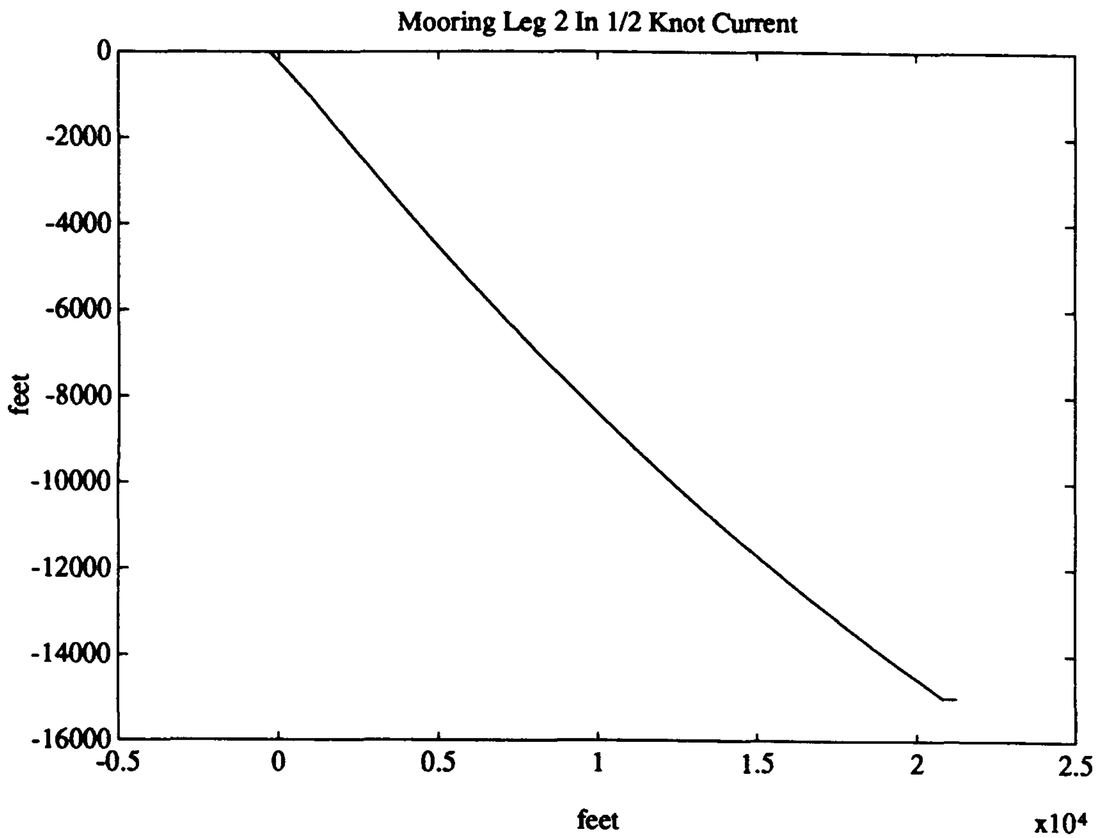



Figure 8d (continued)

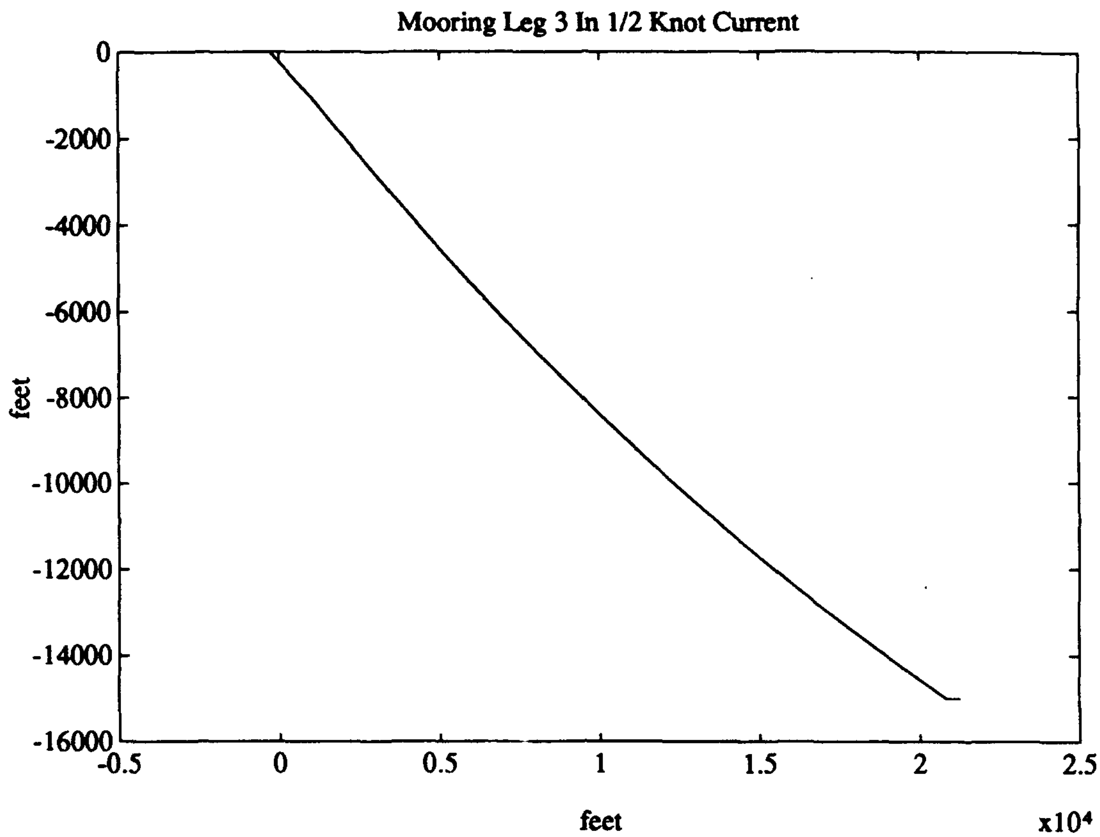

Mooring Leg 3 In 1/2 Knot Current
0
-2000
-4000
-6000
-8000
-10000
-12000
-14000
-16000
feet
-0.5
0
0.5
1
1.5
2
2.5
feet
x10⁴

Figure 8e

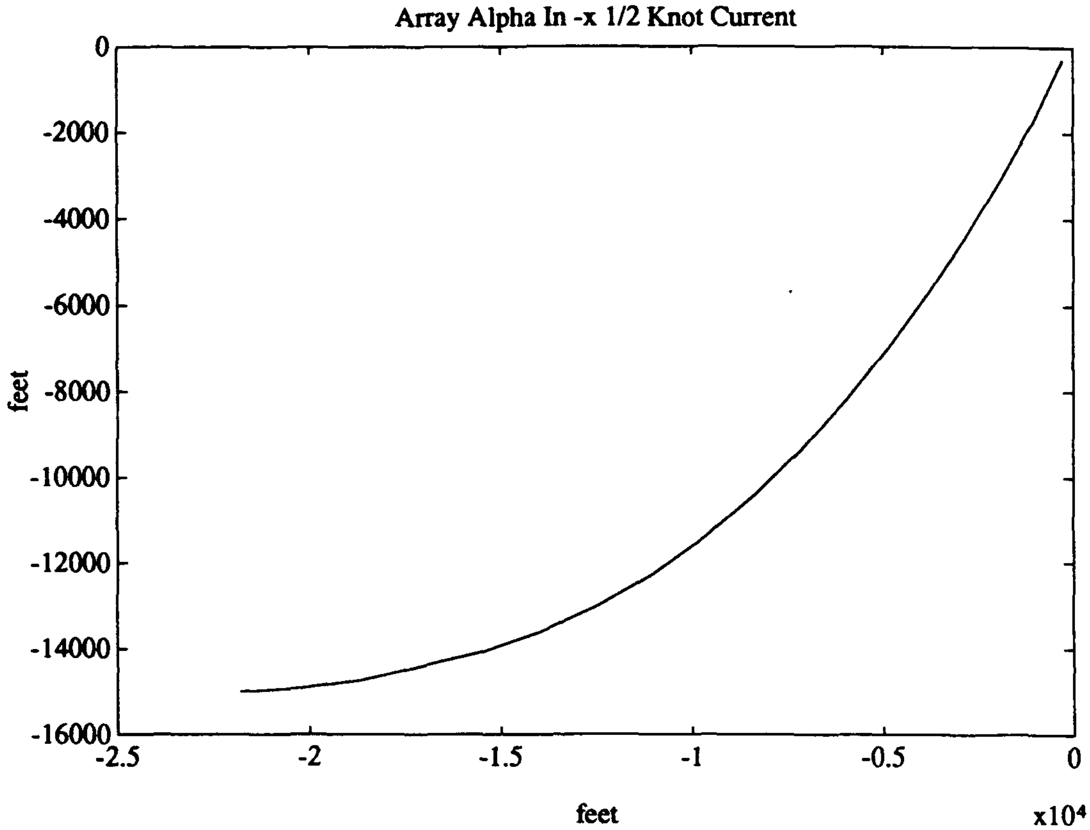



Figure 8e (continued)

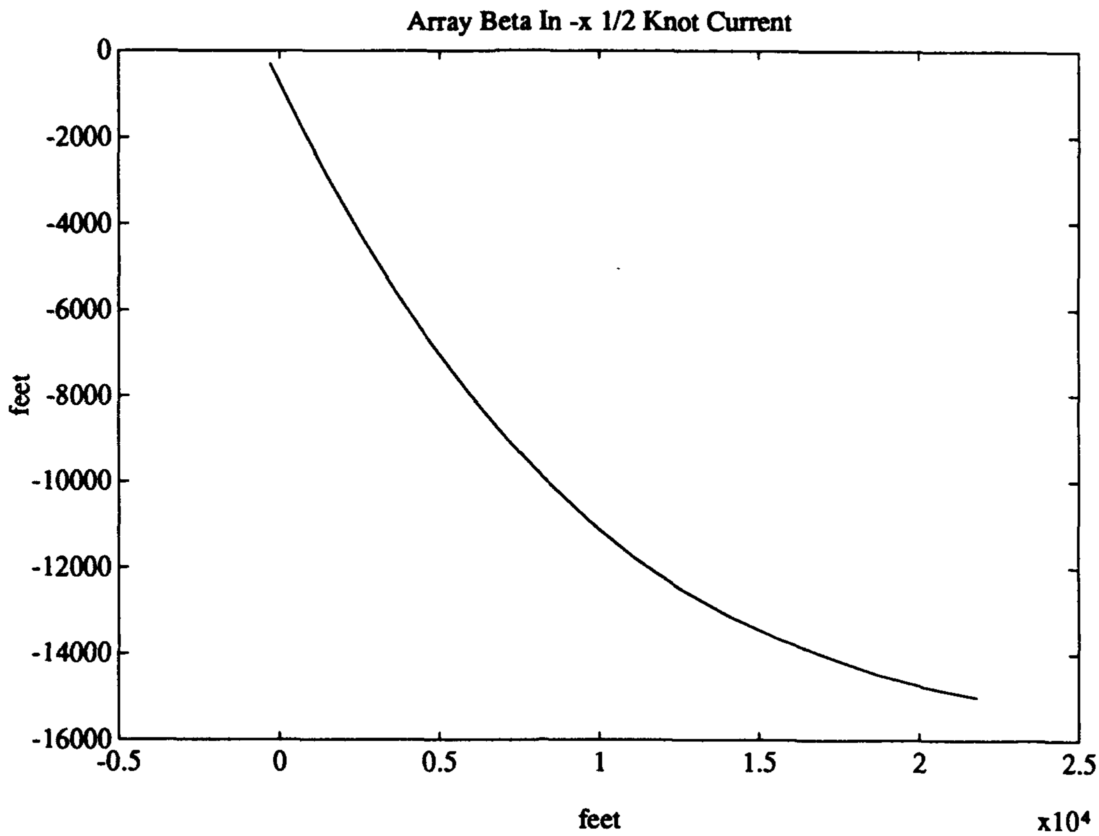

Array Beta In -x 1/2 Knot Current
0
-2000
-4000
-6000
-8000
-10000
-12000
-14000
-16000
feet
-0.5
0
0.5
1
1.5
2
2.5
feet
x10⁴

Figure 8f.

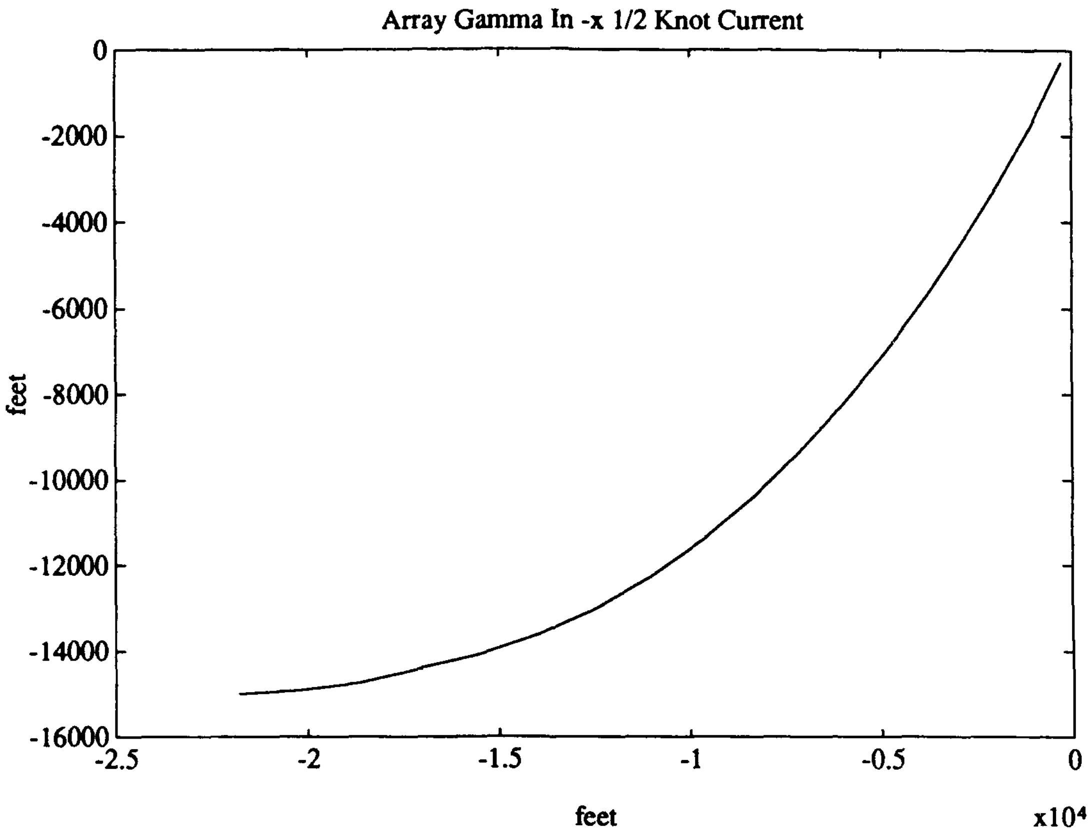



Figure 8f (continued)

```
 NONLINEAR CABLE AND MOORING ANALYSIS PROGRAM -- S E A D Y N  9  0         DATE-hour 2.2 *    TIME-/
#
/usr/1
  VERSION   RLW-UNIX-23MAR91  -DP-


  MESSAGE
     DATE
 16JUL90    Modified Material Damping Input
 03JUL90    Lower case keywords enabled
 13JUN90    RESTART FILE HAS BEEN CHANGED
 13JUN90    REVISED CURR RECORD INPUT FORMAT
 20MAR89    THIS VERSION ALLOWS 250 LIMIT LOCATIONS


   LINE   DIRECT LIST OF INPUT DATA FOR SEADYN

     1   Test case with the array. $
     2   * correct current profile installed.
     3   * current in - x direction
     4   * array weight is .2 lb/ft
     5   *
     6   *
     7   PROB
     8   104,103,-3,-1
     9   FLUID
    10   ,1
    11   NODE                            * Nodes as in ntbk.  1-2-3 anchors.
    12   1,,-21250,0,-15000,3,3,3
    13   2,,-10900,18879,-15000,3,3,3    * ALPHA array
    14   3,,10625,18403,-15000,3,3,3     * B line anchor
    15   4,,21800,0,-15000,3,3,3         * BETA array
    16   5,,10625,-18403,-15000,3,3,3    * C line anchor
    17   6,,-10900,-18879,-15000,3,3,3   * GAMMA array
    18   7,,-20850,0,-15000              * end of A chain
    19   9,,10425,18057,-15000           * end of B chain
    20   11,,10425,-18057,-15000         * end of C chain
    21   103,,0,0,0,0,0,3                * FLIP waterline
    22   104,,0,0,-300,0,0,0             * FLIP stern
    23   NGEN
    24   15,7,103,6,0,13,1,.1068,5000    * line A
    25   16,2,104,6,0,8,1,.1068,2300     * array ALPHA
    26   11,32,104,6,0,38,1,.2,2300
    27   15,9,103,6,0,15,1,.1068,5000    * line B
    28   16,4,104,6,0,10,1,.1068,2300    * array BETA
    29   11,34,104,6,0,40,1,.2,2300
    30   15,11,103,6,0,17,1,.1068,5000   * line C
    31   16,6,104,6,0,12,1,.1068,2300    * array GAMMA
    32   11,36,104,6,0,42,1,.2,2300
    33   LIMIT
```

—echoing input

```
1,-15000,,,1
LLOC
1,7,30,1
ELEM
1,1,7,,4,0                  * chain
2,2,8,,5,0
3,3,9,,4,0                  * chain
4,4,10,,5,0,0
5,5,11,,4,0,0               * chain
6,6,12,,5,0,0
7,7,13,,1,0,0
8,8,14,,5,0,0
9,9,15,,1,0,0
10,10,16,,5,0,0
11,11,17,,1,0,0
12,12,18,,5,0,0
13,13,19,,1,0,0
14,14,20,,5,0,0
15,15,21,,1,0,0
16,16,22,,5,0,0
17,17,23,,1,0,0
18,18,24,,5,0,0
19,19,25,,1,0,0
20,20,26,,5,0,0
21,21,27,,1,0,0
22,22,28,,5,0,0
23,23,29,,1,0,0
24,24,30,,5,0,0
25,25,31,,1,0,0
26,26,32,,5,0,0
27,27,33,,1,0,0
28,28,34,,5,0,0
29,29,35,,1,0,0
30,30,36,,5,0,0
31,31,37,,1,0,0
32,32,38,,2,0,0
33,33,39,,1,0,0
34,34,40,,2,0,0
35,35,41,,1,0,0
36,36,42,,2,0,0
37,37,43,,1,0,0
38,38,44,,2,0,0
39,39,45,,1,0,0
40,40,46,,2,0,0
41,41,47,,1,0,0
42,42,48,,2,0,0
43,43,49,,1,0,0
44,44,50,,2,0,0
45,45,51,,1,0,0
46,46,52,,2,0,0
47,47,53,,1,0,0
48,48,54,,2,0,0
49,49,55,,1,0,0
50,50,56,,2,0,0
51,51,57,,1,0,0
52,52,58,,2,0,0
```

```
53,53,59,,1,0,0
54,54,60,,2,0,0
55,55,61,,1,0,0
56,56,62,,2,0,0
57,57,63,,1,0,0
58,58,64,,2,0,0
59,59,65,,1,0,0
60,60,66,,2,0,0
61,61,67,,1,0,0
62,62,68,,2,0,0
63,63,69,,1,0,0
64,64,70,,2,0,0
65,65,71,,1,0,0
66,66,72,,2,0,0
67,67,73,,1,0,0
68,68,74,,2,0,0
69,69,75,,1,0,0
70,70,76,,2,0,0
71,71,77,,1,0,0
72,72,78,,2,0,0
73,73,79,,1,0,0
74,74,80,,2,0,0
75,75,81,,1,0,0
76,76,82,,2,0,0
77,77,83,,1,0,0
78,78,84,,2,0,0
79,79,85,,1,0,0
80,80,86,,2,0,0
81,81,87,,1,0,0
82,82,88,,2,0,0
83,83,89,,1,0,0
84,84,90,,2,0,0
85,85,91,,1,0,0
86,86,92,,2,0,0
87,87,93,,1,0,0
88,88,94,,2,0,0
89,89,95,,1,0,0
90,90,96,,2,0,0
91,91,97,,1,0,0
92,92,98,,2,0,0
93,93,99,,1,0,0
94,94,100,,2,0,0
95,95,101,,1,0,0
96,96,102,,2,0,0
97,97,103,,1,0,0
98,98,104,,2,0,0
99,99,103,,1,0,0
100,100,104,,2,0,0
101,101,103,,1,0,0
102,102,104,,2,0,0
103,103,104,,3,0,0
TENS
1,97,6,1
2,98,6,2
3,99,6,3
4,100,6,4
```

```
5,101,6,5
6,102,6,6
103,103,0,,1000
MATE
1,,.125,.1068W9,2000000,1      * line
2,,.125,.2W9,200000000,1       * array
3,,17.4,110W9,1000000000,1     * FLIP
4,,.125,50W9,1000000000,1      * chain
5,,.125,.1068W9,2000000,1      * hawser
FLOW
1,2,-12000,-.338,0,0,-500,-.338,0,0,0,-1.688,0,0
DEAD
LIVE
  CURR,1,1,0
END
```

```
NONLINEAR CABLE AND MOORING ANALYSIS PROGRAM -- S E A D Y N  9  0        DATE-hour 2.2 *    TIME-/
#
/usr/l          PAGE     1
        Test case with the array.

SEADYN--Test case with the array.                                             hour 2.2 *   /
#
/usr/l   PAGE     2


N E W   P R O B L E M   D A T A

        NUMBER OF   NODES     =     104
        NUMBER OF ELEMENTS    =     103     NBASE  =     14741
        GRAVITY DIRECTION     =      -3     NIBASE =      2127
        INPUT ECHO FLAG       =      -1
        SHIP LOAD FILE FLAG =         0

        GRAVITATIONAL ACCELERATION =   0.321740E+02
             MATERIAL DAMPING RATIOS FOR (CA1,EA1)   0.500000E-02   0.000000E+00
             MATERIAL DAMPING RATIOS FOR (CA1,EA1)   0.500000E-02   0.000000E+00
             MATERIAL DAMPING RATIOS FOR (CA1,EA1)   0.500000E-02   0.000000E+00
             MATERIAL DAMPING RATIOS FOR (CA1,EA1)   0.500000E-02   0.000000E+00
             MATERIAL DAMPING RATIOS FOR (CA1,EA1)   0.500000E-02   0.000000E+00

 KEY TO STANDARD OUTPUT FIXITY CODES FOR NODAL DISPLACEMENTS
     CODE    EXPLANTION
       1     FIXED, BUT MAY BE SUBJECT TO SPECIFIED LIMIT SET
       2     FIXED WHILE RESERVED FOR PAYOUT
       3     UNCONDITIONALLY FIXED
       M     DYNAMICALLY MOVED
       H     HELD WITH AN IMPOSED DISPLACEMENT
       S     SLAVE COMPONENT
       B     BUOY HELD AT SURFACE LIMIT
             FREE (UNCONSTRAINED) COMPONENT

SEADYN--Test case with the array.                                             hour 2.2 *   /
```

[redacted]

short output form

/usr/1 PAGE 3

L O A D   C A S E   P A R A M E T E R S

SUBANALYSIS TYPE = DEAD

SEADYN--Test case with the array. hour 2.2 * /

/usr/1 PAGE 4

S O L U T I O N   O P T I O N   S U M M A R Y

ANALYSIS TYPE = DEAD
SOLUTION FORM = VRR

[redacted]

—no current

```
NO. OF STATIC STEPS      =   1
OUTPUT INTERVAL          =   0
OPTIONAL OUTPUT CODE     =   0
RESTART FILE FLAG        =   0
START UP OPTION          =   0
NO. OF POINT LOADS       =   0
FLOW FIELD NUMBER        =   0
VISCOUS RELAXATION SOLUTION PARAMETERS
  INTEGRATION PARAMETER   =    0.10000E+01
  INITIAL STEP SIZE       =    0.10000E+01
  INITIAL DAMPING         =    0.10000E-02
  ITERATION LIMIT         =   150
```

SEADYN--Test case with the array. hour 2.2 * /

/usr/1 PAGE 5

DEAD LOAD INCREMENT = 1 LOAD FACTOR 0.10000E+01

| NODE | FIXITY | | | X | Y | Z | VX | VY | VZ | ELT | TENSION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 3 | 3 | -2.125000E+04 | 0.000000E+00 | -1.500000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 1 | 4.682979E+03 |
| 2 | 3 | 3 | 3 | -1.090000E+04 | 1.887900E+04 | -1.500000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 2 | 2.934541E+03 |
| 3 | 3 | 3 | 3 | 1.062500E+04 | 1.840300E+04 | -1.500000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 3 | 4.602804E+03 |
| 4 | 3 | 3 | 3 | 2.180000E+04 | 0.000000E+00 | -1.500000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 4 | 3.002401E+03 |
| 5 | 3 | 3 | 3 | 1.062500E+04 | -1.840300E+04 | -1.500000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 5 | 4.602804E+03 |
| 6 | 3 | 3 | 3 | -1.090000E+04 | -1.887900E+04 | -1.500000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 6 | 2.934541E+03 |
| 7 | | | 1 | -2.085000E+04 | 1.666218E-16 | -1.500000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 7 | 5.151809E+03 |
| 8 | | | | -1.010761E+04 | 1.750301E+04 | -1.487252E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 8 | 2.952995E+03 |
| 9 | | | 1 | 1.042477E+04 | 1.805713E+04 | -1.500000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 9 | 5.051627E+03 |
| 10 | | | | 2.021559E+04 | 4.835830E-15 | -1.485718E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 10 | 3.022357E+03 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 11 | 1 | 1.042477E+04 | -1.805713E+04 | -1.500000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 11 | 5.051627E+03 |
| 12 | | -1.010761E+04 | -1.750301E+04 | -1.487252E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 12 | 2.952995E+03 |
| 13 | | -1.938332E+04 | 7.774578E-16 | -1.432748E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 13 | 5.225784E+03 |
| 14 | | -9.320176E+03 | 1.613561E+04 | -1.465420E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 14 | 2.981030E+03 |
| 15 | | 9.687130E+03 | 1.678297E+04 | -1.433416E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 15 | 5.124959E+03 |
| 16 | | 1.864165E+04 | 9.643867E-15 | -1.462601E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 16 | 3.051627E+03 |
| 17 | | 9.687130E+03 | -1.678297E+04 | -1.433416E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 17 | 5.124959E+03 |
| 18 | | -9.320176E+03 | -1.613561E+04 | -1.465420E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 18 | 2.981030E+03 |
| 19 | | -1.793741E+04 | 1.379664E-15 | -1.361142E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 19 | 5.304296E+03 |
| 20 | | -8.540137E+03 | 1.478107E+04 | -1.434716E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 20 | 3.018380E+03 |
| 21 | | 8.960029E+03 | 1.552701E+04 | -1.362357E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 21 | 5.202954E+03 |
| 22 | | 1.708284E+04 | 1.441008E-14 | -1.430863E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 22 | 3.089945E+03 |
| 23 | | 8.960029E+03 | -1.552701E+04 | -1.362357E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 23 | 5.202954E+03 |
| 24 | | -8.540137E+03 | -1.478107E+04 | -1.434716E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 24 | 3.018380E+03 |
| 25 | | -1.651289E+04 | 1.972969E-15 | -1.285367E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 25 | 5.387145E+03 |
| 26 | | -7.769744E+03 | 1.344327E+04 | -1.395425E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 26 | 3.064703E+03 |
| 27 | | 8.243813E+03 | 1.428986E+04 | -1.287014E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 27 | 5.285404E+03 |
| 28 | | 1.554339E+04 | 1.912146E-14 | -1.390787E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 28 | 3.136977E+03 |
| 29 | | 8.243813E+03 | -1.428986E+04 | -1.287014E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 29 | 5.285404E+03 |
| 30 | | -7.769744E+03 | -1.344327E+04 | -1.395425E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 30 | 3.064703E+03 |
| 31 | | -1.511028E+04 | 2.557162E-15 | -1.205610E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 31 | 5.474135E+03 |
| 32 | | -7.010989E+03 | 1.212568E+04 | -1.347899E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 32 | 3.147738E+03 |
| 33 | | 7.538752E+03 | 1.307197E+04 | -1.207583E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 33 | 5.372104E+03 |
| 34 | | 1.402706E+04 | 2.376625E-14 | -1.342710E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 34 | 3.222930E+03 |
| 35 | | 7.538752E+03 | -1.307197E+04 | -1.207583E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 35 | 5.372104E+03 |
| 36 | | -7.010989E+03 | -1.212568E+04 | -1.347899E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 36 | 3.147738E+03 |
| 37 | | -1.372996E+04 | 3.132080E-15 | -1.122054E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 37 | 5.565069E+03 |
| 38 | | -6.253133E+03 | 1.080965E+04 | -1.287535E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 38 | 3.282553E+03 |
| 39 | | 6.845054E+03 | 1.187371E+04 | -1.124254E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 39 | 5.462852E+03 |
| 40 | | 1.250962E+04 | -4.172080E-14 | -1.282051E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 40 | 3.355863E+03 |
| 41 | | 6.845054E+03 | -1.187371E+04 | -1.124254E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 41 | 5.462852E+03 |
| 42 | | -6.253133E+03 | -1.080965E+04 | -1.287535E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 42 | 3.282553E+03 |
| 43 | | -1.237219E+04 | 3.697610E-15 | -1.034882E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 43 | 5.659757E+03 |
| 44 | | -5.526325E+03 | 9.547539E+03 | -1.213370E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 44 | 3.443813E+03 |
| 45 | | 6.162862E+03 | 1.069533E+04 | -1.037216E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 45 | 5.557448E+03 |
| 46 | | 1.105330E+04 | -3.782817E-14 | -1.207870E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 46 | 3.516325E+03 |
| 47 | | 6.162862E+03 | -1.069533E+04 | -1.037216E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 47 | 5.557448E+03 |
| 48 | | -5.526325E+03 | -9.547539E+03 | -1.213370E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 48 | 3.443813E+03 |
| 49 | | -1.103713E+04 | 4.253685E-15 | -9.442680E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 49 | 5.758013E+03 |
| 50 | | -4.833349E+03 | 8.344176E+03 | -1.127139E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 50 | 3.626418E+03 |
| 51 | | 5.492263E+03 | 9.536971E+03 | -9.466509E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 51 | 5.655699E+03 |
| 52 | | 9.663262E+03 | -3.409747E-14 | -1.121869E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 52 | 3.698796E+03 |
| 53 | | 5.492263E+03 | -9.536971E+03 | -9.466509E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 53 | 5.655699E+03 |
| 54 | | -4.833349E+03 | -8.344176E+03 | -1.127139E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 54 | 3.626418E+03 |
| 55 | | -9.724854E+03 | 4.800275E-15 | -8.503854E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 55 | 5.859656E+03 |
| 56 | | -4.175289E+03 | 7.201447E+03 | -1.030514E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 56 | 3.828708E+03 |
| 57 | | 4.833296E+03 | 8.398704E+03 | -8.527389E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 57 | 5.757418E+03 |
| 58 | | 8.341647E+03 | -3.054152E-14 | -1.025653E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 58 | 3.900202E+03 |
| 59 | | 4.833296E+03 | -8.398704E+03 | -8.527389E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 59 | 5.757418E+03 |
| 60 | | -4.175289E+03 | -7.201447E+03 | -1.030514E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 60 | 3.828708E+03 |
| 61 | | -8.435339E+03 | 5.337388E-15 | -7.533998E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 61 | 5.964513E+03 |
| 62 | | -3.551946E+03 | 6.119003E+03 | -9.250250E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 62 | 4.047409E+03 |
| 63 | | 4.185953E+03 | 7.280516E+03 | -7.556521E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 63 | 5.862423E+03 |
| 64 | | 7.088156E+03 | -2.697913E-14 | -9.206901E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 64 | 4.117770E+03 |
| 65 | | 4.185953E+03 | -7.280516E+03 | -7.556521E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 65 | 5.862423E+03 |
| 66 | | -3.551946E+03 | -6.119003E+03 | -9.250250E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 66 | 4.047409E+03 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 67 | | -7.168492E+03 | 5.865062E-15 | -6.534710E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 67 | 6.072416E+03 |
| 68 | | -2.962238E+03 | 5.094966E+03 | -8.120179E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 68 | 4.279957E+03 |
| 69 | | 3.550185E+03 | 6.182324E+03 | -6.555565E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 69 | 5.970541E+03 |
| 70 | | 5.900802E+03 | -2.349240E-14 | -8.082816E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 70 | 4.349077E+03 |
| 71 | | 3.550185E+03 | -6.182324E+03 | -6.555565E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 71 | 5.970541E+03 |
| 72 | | -2.962238E+03 | -5.094966E+03 | -8.120179E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 72 | 4.279957E+03 |
| 73 | | -5.924155E+03 | 6.383361E-15 | -5.507526E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 73 | 6.183204E+03 |
| 74 | | -2.404537E+03 | 4.126511E+03 | -6.926506E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 74 | 4.525635E+03 |
| 75 | | 2.925912E+03 | 5.103987E+03 | -5.526116E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 75 | 6.081605E+03 |
| 76 | | 4.776531E+03 | -2.012760E-14 | -6.895504E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 76 | 4.592047E+03 |
| 77 | | 2.925912E+03 | -5.103987E+03 | -5.526116E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 77 | 6.081605E+03 |
| 78 | | -2.404537E+03 | -4.126511E+03 | -6.926506E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 78 | 4.525635E+03 |
| 79 | | -4.702111E+03 | 6.892376E-15 | -4.453913E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 79 | 6.296725E+03 |
| 80 | | -1.876922E+03 | 3.210300E+03 | -5.679022E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 80 | 4.778394E+03 |
| 81 | | 2.313021E+03 | 4.045309E+03 | -4.469696E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 81 | 6.195458E+03 |
| 82 | | 3.711699E+03 | -1.689810E-14 | -5.654510E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 82 | 4.844926E+03 |
| 83 | | 2.313021E+03 | -4.045309E+03 | -4.469696E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 83 | 6.195458E+03 |
| 84 | | -1.876922E+03 | -3.210300E+03 | -5.679022E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 84 | 4.778394E+03 |
| 85 | | -3.502098E+03 | 7.392217E-15 | -3.375272E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 85 | 6.412832E+03 |
| 86 | | -1.377355E+03 | 2.342796E+03 | -4.385930E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 86 | 5.040987E+03 |
| 87 | | 1.711373E+03 | 3.006053E+03 | -3.387757E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 87 | 6.311946E+03 |
| 88 | | 2.702414E+03 | -1.381434E-14 | -4.367868E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 88 | 5.106248E+03 |
| 89 | | 1.711373E+03 | -3.006053E+03 | -3.387757E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 89 | 6.311946E+03 |
| 90 | | -1.377355E+03 | -2.342796E+03 | -4.385930E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 90 | 5.040987E+03 |
| 91 | | -2.323810E+03 | 7.883009E-15 | -2.272937E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 91 | 6.531387E+03 |
| 92 | | -9.038001E+02 | 1.520461E+03 | -3.054066E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 92 | 5.310748E+03 |
| 93 | | 1.120810E+03 | 1.985944E+03 | -2.281680E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 93 | 6.430927E+03 |
| 94 | | 1.744757E+03 | -1.090061E-14 | -3.042303E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 94 | 5.374767E+03 |
| 95 | | 1.120810E+03 | -1.985944E+03 | -2.281680E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 95 | 6.430927E+03 |
| 96 | | -9.038001E+02 | -1.520461E+03 | -3.054066E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 96 | 5.310748E+03 |
| 97 | | -1.166908E+03 | 8.364895E-15 | -1.148175E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 97 | 6.652373E+03 |
| 98 | | -4.542910E+02 | 7.398817E+02 | -1.689117E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 98 | 5.586222E+03 |
| 99 | | 5.411535E+02 | 9.846754E+02 | -1.152776E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 99 | 6.552385E+03 |
| 100 | | 8.349296E+02 | -8.161531E-15 | -1.683431E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 100 | 5.649059E+03 |
| 101 | | 5.411535E+02 | -9.846754E+02 | -1.152776E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 101 | 6.552385E+03 |
| 102 | | -4.542910E+02 | -7.398817E+02 | -1.689117E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 102 | 5.586222E+03 |
| 103 | 3 | -2.889645E+01 | 8.838914E-15 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 103 | 3.130020E+04 |
| 104 | | -2.821794E+01 | -5.523513E-15 | -3.000083E+02 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | | |

NUMBER OF ITERATIONS 8

[redacted]

__mooring line tens.
elem. 97,99,101

SEADYN--Test case with the array.          hour 2.2 * /

[redacted]

__array tension
elem. 98,100,102

#
/usr/l PAGE 6

L O A D   C A S E   P A R A M E T E R S

SUBANALYSIS TYPE = LIVE

CURRENT FIELD DATA

| NUMBER | FLOW FIELD MULTIPLIER | VARIATION | CODE |
|---|---|---|---|
| 1 | 0.100000E+01 | 0 | |
| 0 | 0.100000E+01 | 0 | |

| | | |
|---|---|---|
| 0 | 0.100000E+01 | 0 |
| 0 | 0.100000E+01 | 0 |
| 0 | 0.100000E+01 | 0 |

SEADYN--Test case with the array. hour 2.2 * /
/usr/1 PAGE 7

S O L U T I O N   O P T I O N   S U M M A R Y

[redacted]
___ with current

ANALYSIS TYPE = LIVE
SOLUTION FORM = VRR

NO. OF STATIC STEPS = 1
OUTPUT INTERVAL = 0
OPTIONAL OUTPUT CODE = 0
RESTART FILE FLAG = 0
START UP OPTION = 0
NO. OF POINT LOADS = 0
FLOW FIELD NUMBER = 1
VISCOUS RELAXATION SOLUTION PARAMETERS
INTEGRATION PARAMETER = 0.10000E+01
INITIAL STEP SIZE = 0.10000E+01
INITIAL DAMPING = 0.10000E-02
ITERATION LIMIT = 150

SEADYN--Test case with the array. hour 2.2 * /
/usr/1 PAGE 8

STEADY STATE INCREMENT = 1 LOAD FACTOR 0.10000E+01

| NODE | FIXITY | | | X | Y | Z | VX | VY | VZ | ELT | TENSION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 3 | 3 | -2.125000E+04 | 0.000000E+00 | -1.500000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 1 | 2.904159E+03 |
| 2 | 3 | 3 | 3 | -1.090000E+04 | 1.887900E+04 | -1.500000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 2 | 2.715168E+03 |
| 3 | 3 | 3 | 3 | 1.062500E+04 | 1.840300E+04 | -1.500000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 3 | 6.647011E+03 |
| 4 | 3 | 3 | 3 | 2.180000E+04 | 0.000000E+00 | -1.500000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 4 | 3.538697E+03 |
| 5 | 3 | 3 | 3 | 1.062500E+04 | -1.840300E+04 | -1.500000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 5 | 6.647011E+03 |
| 6 | 3 | 3 | 3 | -1.090000E+04 | -1.887900E+04 | -1.500000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 6 | 2.715168E+03 |
| 7 | | | 1 | -2.085000E+04 | -9.349194E-15 | -1.500000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 7 | 3.065370E+03 |
| 8 | | | | -1.014620E+04 | 1.747843E+04 | -1.491573E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 8 | 2.729433E+03 |
| 9 | | | 1 | 1.041560E+04 | 1.806260E+04 | -1.500000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 9 | 7.490892E+03 |
| 10 | | | | 2.022537E+04 | -2.189426E-14 | -1.477050E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 10 | 3.567116E+03 |
| 11 | | | 1 | 1.041560E+04 | -1.806260E+04 | -1.500000E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 11 | 7.490892E+03 |
| 12 | | | | -1.014620E+04 | -1.747843E+04 | -1.491573E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 12 | 2.729433E+03 |
| 13 | | | | -1.932293E+04 | -4.504933E-14 | -1.448417E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 13 | 3.124621E+03 |
| 14 | | | | -9.396342E+03 | 1.608517E+04 | -1.473276E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 14 | 2.754122E+03 |
| 15 | | | | 9.663467E+03 | 1.683995E+04 | -1.425389E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 15 | 7.571820E+03 |
| 16 | | | | 1.866330E+04 | -4.360629E-14 | -1.446716E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 16 | 3.603305E+03 |
| 17 | | | | 9.663467E+03 | -1.683995E+04 | -1.425389E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 17 | 7.571820E+03 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 18 | -9.396342E+03 | -1.608517E+04 | -1.473276E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 18 | 2.754122E+03 |
| 19 | -1.782483E+04 | -8.006598E-14 | -1.388947E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 19 | 3.192035E+03 |
| 20 | -8.653200E+03 | 1.470439E+04 | -1.445319E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 20 | 2.788957E+03 |
| 21 | 8.919354E+03 | 1.563033E+04 | -1.347895E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 21 | 7.655762E+03 |
| 22 | 1.711694E+04 | -6.509236E-14 | -1.409195E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 22 | 3.647031E+03 |
| 23 | 8.919354E+03 | -1.563033E+04 | -1.347895E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 23 | 7.655762E+03 |
| 24 | -8.653200E+03 | -1.470439E+04 | -1.445319E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 24 | 2.788957E+03 |
| 25 | -1.635838E+04 | -1.143419E-13 | -1.322053E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 25 | 3.267106E+03 |
| 26 | -7.919334E+03 | 1.334086E+04 | -1.408009E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 26 | 2.833565E+03 |
| 27 | 8.183381E+03 | 1.443394E+04 | -1.267612E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 27 | 7.742578E+03 |
| 28 | 1.558915E+04 | -8.631506E-14 | -1.364724E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 28 | 3.698027E+03 |
| 29 | 8.183381E+03 | -1.443394E+04 | -1.267612E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 29 | 7.742578E+03 |
| 30 | -7.919334E+03 | -1.334086E+04 | -1.408009E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 30 | 2.833565E+03 |
| 31 | -1.492562E+04 | -1.478300E-13 | -1.248219E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 31 | 3.349470E+03 |
| 32 | -7.197016E+03 | 1.199877E+04 | -1.361737E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 32 | 2.915416E+03 |
| 33 | 7.456371E+03 | 1.325065E+04 | -1.184609E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 33 | 7.832113E+03 |
| 34 | 1.408246E+04 | -1.072433E-13 | -1.313568E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 34 | 3.785145E+03 |
| 35 | 7.456371E+03 | -1.325065E+04 | -1.184609E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 35 | 7.832113E+03 |
| 36 | -7.197016E+03 | -1.199877E+04 | -1.361737E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 36 | 2.915416E+03 |
| 37 | -1.352774E+04 | -1.802535E-13 | -1.167976E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 37 | 3.438894E+03 |
| 38 | -6.476727E+03 | 1.066046E+04 | -1.301674E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 38 | 3.050728E+03 |
| 39 | 6.741280E+03 | 1.207943E+04 | -1.098895E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 39 | 7.924474E+03 |
| 40 | 1.257063E+04 | -1.281989E-13 | -1.251521E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 40 | 3.937572E+03 |
| 41 | 6.741280E+03 | -1.207943E+04 | -1.098895E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 41 | 7.924474E+03 |
| 42 | -6.476727E+03 | -1.066046E+04 | -1.301674E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 42 | 3.050728E+03 |
| 43 | -1.216433E+04 | -2.106390E-13 | -1.082009E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 43 | 3.534220E+03 |
| 44 | -5.788314E+03 | 9.381371E+03 | -1.226759E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 44 | 3.213756E+03 |
| 45 | 6.038855E+03 | 1.092018E+04 | -1.010539E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 45 | 8.019601E+03 |
| 46 | 1.111118E+04 | -1.897309E-13 | -1.177956E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 46 | 4.077794E+03 |
| 47 | 6.038855E+03 | -1.092018E+04 | -1.010539E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 47 | 8.019601E+03 |
| 48 | -5.788314E+03 | -9.381371E+03 | -1.226759E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 48 | 3.213756E+03 |
| 49 | -1.083515E+04 | -2.387782E-13 | -9.908364E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 49 | 3.634810E+03 |
| 50 | -5.132814E+03 | 8.167689E+03 | -1.139056E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 50 | 3.400337E+03 |
| 51 | 5.349095E+03 | 9.773044E+03 | -9.196326E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 51 | 8.117398E+03 |
| 52 | 9.709179E+03 | -2.111855E-13 | -1.093920E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 52 | 4.254413E+03 |
| 53 | 5.349095E+03 | -9.773044E+03 | -9.196326E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 53 | 8.117398E+03 |
| 54 | -5.132814E+03 | -8.167689E+03 | -1.139056E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 54 | 3.400337E+03 |
| 55 | -9.539935E+03 | -2.647299E-13 | -8.948997E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 55 | 3.740211E+03 |
| 56 | -4.503972E+03 | 7.023465E+03 | -1.040679E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 56 | 3.606454E+03 |
| 57 | 4.671978E+03 | 8.638160E+03 | -8.262635E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 57 | 8.217771E+03 |
| 58 | 8.367362E+03 | -2.323871E-13 | -1.000540E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 58 | 4.448797E+03 |
| 59 | 4.671978E+03 | -8.638160E+03 | -8.262635E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 59 | 8.217771E+03 |
| 60 | -4.503972E+03 | -7.023465E+03 | -1.040679E+04 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 60 | 3.606454E+03 |
| 61 | -8.278123E+03 | -2.885742E-13 | -7.946095E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 61 | 3.850002E+03 |
| 62 | -3.900358E+03 | 5.947644E+03 | -9.333807E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 62 | 3.828890E+03 |
| 63 | 4.007461E+03 | 7.515624E+03 | -7.305189E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 63 | 8.320628E+03 |
| 64 | 7.086587E+03 | -2.536170E-13 | -8.989242E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 64 | 4.658655E+03 |
| 65 | 4.007461E+03 | -7.515624E+03 | -7.305189E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 65 | 8.320628E+03 |
| 66 | -3.900358E+03 | -5.947644E+03 | -9.333807E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 66 | 3.828890E+03 |
| 67 | -7.048939E+03 | -3.104056E-13 | -6.903448E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 67 | 3.963797E+03 |
| 68 | -3.321535E+03 | 4.936908E+03 | -8.186273E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 68 | 4.064952E+03 |
| 69 | 3.355484E+03 | 6.405505E+03 | -6.324841E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 69 | 8.425879E+03 |
| 70 | 5.866377E+03 | -2.748232E-13 | -7.900904E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 70 | 4.882081E+03 |
| 71 | 3.355484E+03 | -6.405505E+03 | -6.324841E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 71 | 8.425879E+03 |
| 72 | -3.321535E+03 | -4.936908E+03 | -8.186273E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 72 | 4.064952E+03 |
| 73 | -5.851453E+03 | -3.303249E-13 | -5.824535E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 73 | 4.081244E+03 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 74 | | -2.766481E+03 | 3.987087E+03 | -6.976503E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 74 | 4.312396E+03 |
| 75 | | 2.715968E+03 | 5.307848E+03 | -5.322424E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 75 | 8.533435E+03 |
| 76 | | 4.705286E+03 | -2.958563E-13 | -6.749567E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 76 | 5.117355E+03 |
| 77 | | 2.715968E+03 | -5.307848E+03 | -5.322424E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 77 | 8.533435E+03 |
| 78 | | -2.766481E+03 | -3.987087E+03 | -6.976503E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 78 | 4.312396E+03 |
| 79 | | -4.684624E+03 | -3.484331E-13 | -4.712527E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 79 | 4.202021E+03 |
| 80 | | -2.233853E+03 | 3.093675E+03 | -5.714698E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 80 | 4.569369E+03 |
| 81 | | 2.088823E+03 | 4.222673E+03 | -4.298749E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 81 | 8.643211E+03 |
| 82 | | 3.601197E+03 | -3.165361E-13 | -5.543361E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 82 | 5.362953E+03 |
| 83 | | 2.088823E+03 | -4.222673E+03 | -4.298749E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 83 | 8.643211E+03 |
| 84 | | -2.233853E+03 | -3.093675E+03 | -5.714698E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 84 | 4.569369E+03 |
| 85 | | -3.547340E+03 | -3.648300E-13 | -3.570308E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 85 | 4.325838E+03 |
| 86 | | -1.722165E+03 | 2.252150E+03 | -4.409239E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 86 | 4.834352E+03 |
| 87 | | 1.473941E+03 | 3.149981E+03 | -3.254608E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 87 | 8.755124E+03 |
| 88 | | 2.551572E+03 | -3.367495E-13 | -4.289404E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 88 | 5.617587E+03 |
| 89 | | 1.473941E+03 | -3.149981E+03 | -3.254608E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 89 | 8.755124E+03 |
| 90 | | -1.722165E+03 | -2.252150E+03 | -4.409239E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 90 | 4.834352E+03 |
| 91 | | -2.438450E+03 | -3.796148E-13 | -2.400492E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 91 | 4.452431E+03 |
| 92 | | -1.229898E+03 | 1.458169E+03 | -3.066998E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 92 | 5.106101E+03 |
| 93 | | 8.712053E+02 | 2.089750E+03 | -2.190768E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 93 | 8.869092E+03 |
| 94 | | 1.553647E+03 | -3.565672E-13 | -2.993878E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 94 | 5.880119E+03 |
| 95 | | 8.712053E+02 | -2.089750E+03 | -2.190768E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 95 | 8.869092E+03 |
| 96 | | -1.229898E+03 | -1.458169E+03 | -3.066998E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 96 | 5.106101E+03 |
| 97 | | -1.356787E+03 | -3.928862E-13 | -1.205445E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 97 | 4.583285E+03 |
| 98 | | -7.555739E+02 | 7.076743E+02 | -1.693601E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 98 | 5.383147E+03 |
| 99 | | 2.804862E+02 | 1.041942E+03 | -1.107973E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 99 | 8.983832E+03 |
| 100 | | 6.045610E+02 | -3.763524E-13 | -1.662124E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 100 | 6.148296E+03 |
| 101 | | 2.804862E+02 | -1.041942E+03 | -1.107973E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 101 | 8.983832E+03 |
| 102 | | -7.555739E+02 | -7.076743E+02 | -1.693601E+03 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 102 | 5.383147E+03 |
| 103 | 3 | -2.821204E+02 | -4.004537E-13 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | 103 | 3.130203E+04 |
| 104 | | -2.916135E+02 | -3.984886E-13 | -2.998589E+02 | 0.000000E+00 | 0.000000E+00 | 0.000000E+00 | | |

NUMBER OF ITERATIONS 5

NORMAL TERMINATION OF SEADYN

mooring line tens.
elem. 97,99,101

array tension
elem. 98,100,102

FLIP excursion is
282 ft at water line

## Example Four

array.3.in
.out

15,000 ft Depth, Weighted Arrays

This is a description of array.3.in and array.3.out, the input and output files of a Seadyn run in 15,000 ft of water with weighted arrays. With the increase in depth, the mooring lines and arrays have become longer, and the excursions of their anchors have become greater. The excursion to depth ratio is the same as it is in the second and third examples. This means that the mooring lines and arrays will have the same shape, this trial will just have longer legs. The weights increase with the increase in length, as do the tensions in each leg.

Input File (array.3.in):

The anchor coordinates are different, but the ratio of these coordinates to the coordinates of array.2 (or array.1) is the same as the ratio of the new depth to the old one. This means that the shapes of the mooring lines and arrays are the same as they are in array.2. The added length adds weight to each leg, and to make the horizontal component of the tension what it should be, the initial catenary horizontal tension in the NGEN card must be increased. In this case it was increased from 1,300 lbs in array.2 to 2,300 lbs in array.3. The length of the line that connects the array to the anchor is still about 7,500 ft.

Output File (array.3.out):

This is the same shortened form as is in array.1 and array.2. The tensions at the interface between FLIP and the mooring lines, or arrays, is greater than the one in array.2. This is because the added length adds weight to each leg and that increases the vertical component of the tension. FLIP's excursion is about the same because the mooring legs have had their tensions increased proportionally to the depth ratio. This allows for only a slight increase in FLIP's mobility.

12,000 ft Depth, Weighted Array
vs.
15,000 ft Depth, Weighted Array

This is a comparison of the array.2 (example 3) and array.3 (example 4) files. The depth has been increased by 3,000 ft to 15,000 ft in the array.3 file. Most of the input parameters are the same, but the ones that are dependent on the depth have been corrected to handle the 15,000 ft system. The changes in the input start with the addition of three nodes per leg. Adding these nodes allows the element length to remain approximately the same as it is in array.2. This makes for a PROB card with 104 nodes and 103 elements, as opposed to the 86 nodes and 85 elements in array.2. The anchor coordinates in the NODE card are altered to be proportionally the same as they are in the array.2 NODE card. The mooring line anchor excursion has been increased to 21,250 ft per leg, and the array anchor excursion has been increased to 21,800 ft per leg. This is up from 17,000 ft per mooring line leg, and 17,439 ft in the array legs. FLIP is now described by nodes 103 and 104.

The NGEN card has been altered the most. There must now be 15 nodes generated per mooring line leg, as opposed to 12 in array.2 There also must be 16 nodes generated in the array legs, as opposed to 13 in array.2. The starting node for each generation is the same as it is in array.2, but the ending nodes are now 103 for the mooring lines, and 104 for the arrays. The first nodes generated are the same because the element lengths are the same as they are in array.2. So to have the 7,500 ft leader in the arrays, the same number of elements must be employed. This is why the extra nodes and elements were introduced in this example. The weights are the same as they are in array.2, but the last word in each line of this, the NGEN card, is different. These numbers are the initial horizontal tensions in the legs that are used to calculate the catenary that the mooring lines and arrays produce. The mooring lines have increased to 5,000 lbs from 4,000 lbs which is proportional to the depth ratio, but the arrays have increased from 1,300 lbs to 2,300 lbs which is not proportional at all. The reason for this disproportional increase is that the three new elements in each array are made of 0.200 lbs/ft material which throws the ratio of 0.1068 lbs/ft to 0.200 lbs/ft material off from what it is in array.2. This helps to explain the large jump. The method used to find these numbers is the good old keep changing things until the answers start falling into place method. With the added weight, the new vertical component of the tension can be calculated, and from this, the tension at the FLIP/leg interface can be found. From this known data, different input trials are used to come up with the correct output in a no current situation. Trial and error is the key to Seadyn manipulation.

The tensions at the FLIP/array interface are between 5,586 lbs and 5,650 lbs per array leg. This is up from 3,779 lbs and 3,809 lbs per array leg and is due to the added weight from the new length of the arrays. When the current is introduced, these tensions change tho 5,383 lbs in the Alpha and Gamma array legs, and 6,148 lbs in the Beta array leg. This is up from 3,637 lbs in the Alpha and Gamma legs, and 4,109 lbs in the Beta array leg. All of these new tensions are above 5,000 lbs, and the operating parameters of the array state that the tensions in each array leg can not exceed a 4,000 lbs working load. Even the no current situation with this weight of array in 15,000 ft of water surpasses this parameter. The conclusion to make from this is that if the arrays are to be deployed in 15,000 ft of water, they will have to weigh less.

Several different array weights, such as 0.150 lbs /ft and 0.125 lbs/ft, must be chosen in order to start working on finding the correct array weight. Then a trial run with the present horizontal tensions in the NGEN card should be run. From this trial run, an approximate length of the arrays and their approximate angle at the FLIP/array interface can be obtained. Then roughly calculate their total weight by multiplying this new weight by the approximate length of the array. Do not forget the 7,500 ft of 0.1068 lbs/ft line that connects the array to its anchor. The total weight is equal to the vertical component of the tension at the FLIP/array interface. With this component and the angle known, the approximate tension at the interface in a no current situation is known. The procedure is to then manipulate the horizontal component of the tension at the bottom of the catenary in the NGEN card. This value is the last word in each line of the NGEN card.

FLIP's water line excursions are 29 ft in the negative "x" direction with no current, and 282 ft in the negative "x" direction with the current. Her stern excursions are 28 ft in the negative "x" direction with no current, and 292 ft with the current. Her total water line excursion in 15,000 ft of water is 254 ft and her total stern excursion is 264 ft . These excursions did not increase with the depth because the mooring lines were tightened proportionally to the new depth. This, along with the added horizontal tensions in each array leg, keeps the system at the surface more less the way it is in the array.2 example. The only significant difference at FLIP is the increased tensions. This model has shown that this weight in this depth will not work. Some trials will have to be run with lighter arrays to find what the correct weight is for this problem.

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